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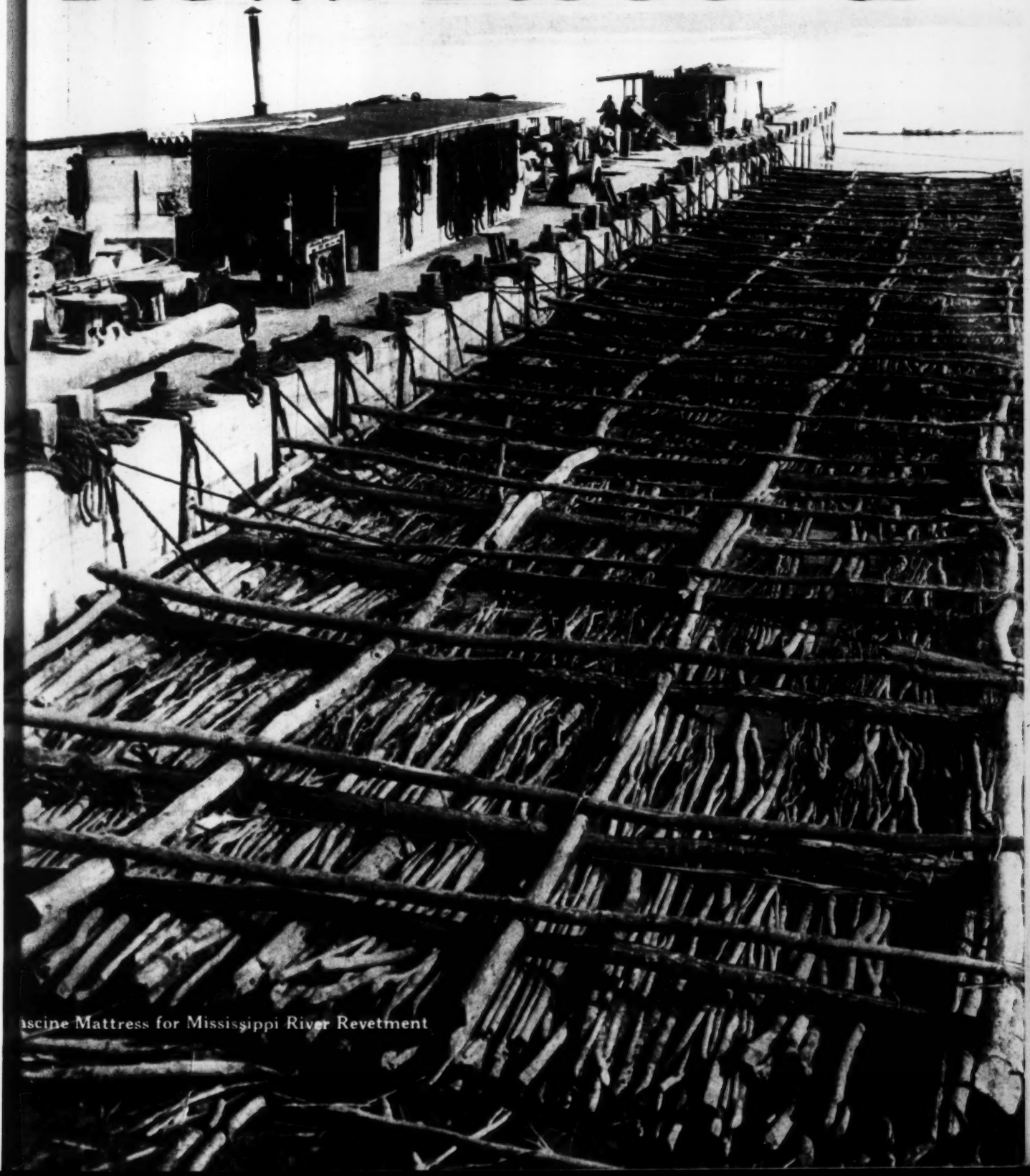
July 3, 1930

JUL 5 1930

Engineering News-Record



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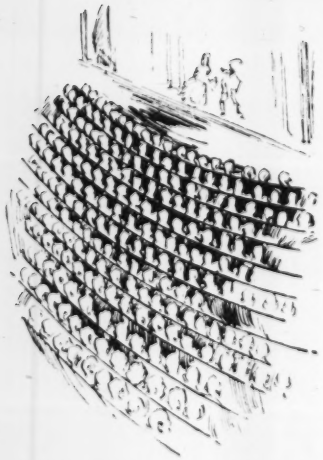

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McGRAW-HILL PUBLISHING COMPANY, INC., Tenth Ave. at 36th St., NEW YORK, N. Y.

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CABLE ADDRESS: "MACHINIST, N. Y."

Published weekly. $5 per year. 25 cents per copy. Entered as second-class matter April 11, 1917, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A.

Member A.B.C.
Member A.B.P.

NUMBER OF COPIES PRINTED THIS ISSUE, 29,885

NEW YORK District Office, 285 Madison Avenue
WASHINGTON, National Press Building
CHICAGO, 520 N. Michigan Avenue
PHILADELPHIA, 1600 Arch Street
CLEVELAND, Guardian Building
ST. LOUIS, Bell Telephone Building
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ENGINEERING NEWS-RECORD

A McGRAW-HILL PUBLICATION — ESTABLISHED 1874

DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

F. E. SCHMITT, *Editor*

Volume 105 NEW YORK, JULY 3, 1930 Number 1

An Opportunity for Vision

TO THE committee now considering plans for the newly authorized national hydraulic laboratory we commend thoughtful consideration of the words attributed to Daniel Burnham: "Make no little plans." Two courses are open to the committee: It can plan a conventional laboratory to make routine tests for government departments, or it can grasp the opportunity of a lifetime to procure for this country facilities which, under competent direction, will permit the extension of hydraulic knowledge into regions hitherto inaccessible for lack of proper experimental equipment. There is reason to believe that the latter course need not be unduly expensive —a fortunate condition. If it should be confirmed, there can be no excuse for failure to plan the laboratory boldly and make the utmost use of its potentialities. Little plans at this time will discredit the entire engineering profession.

Confirmation From an Authority

FURTHER evidence of the inadequacy of present facilities for hydraulic research experimentation is given in the will of the late Clemens Herschel, whose opinions are high authority in the field of hydraulics. Mr. Herschel, after commenting on the fact that the small laboratories now in use are incapable of meeting the demands made upon them, bequeathed to Harvard University the sum of $50,000 as the nucleus of a fund for the establishment of a new institution of greater possibilities. It is interesting to note that he considers $200,000 the smallest amount necessary to accomplish his purpose; Congress is expected to appropriate $350,000 for the construction of the national hydraulic laboratory. Comparison of the two amounts gives full justification for the expectation that the new institution in Washington should mark a great advance over present resources. Planned so as to apply the construction fund with highest efficiency to the needs of a primitive, developing art, and directed with the genius of enthusiasm, it can become a power for engineering progress.

Stabilization Through Public Works

LAST year the ancient ideal of using public works as a stabilizer of employment and business activity came into new prominence when the President's Committee on Recent Economic Changes undertook to study its practical value. The committee had completed its descriptive survey of the remarkable seven-year period of sustained prosperity, 1922 to 1929, and proceeded to inquire into the possibility of steadying the balance, in case of any disturbance, by taking up slack through additional public-works construction. It now reports on this study. In the meantime the events of the past six months showed that only little industrial slack can be taken up in this way, since powerful appeals after the business depression did not increase the volume of public construction markedly over what had previously been projected. The committee's conclusion is in accord with this practical showing; it says that the best use of public works as a balancing factor can be made by "promptly and comprehensively expediting work on projects already planned rather than initiating new undertakings." This is in harmony with the recognized truth that public works, like private works, are essentially a response to definite needs and are not readily held in reserve or accelerated arbitrarily, a fact which we pointed out at the time the movement to promote public-works acceleration began. The committee's conclusion has the virtue of throwing clear light on the situation. But it is important to recall that public works reach the huge figure of three and a half billions per year, a third of the country's entire construction. Such a figure means that public-works construction, even though it may not serve as a compensating device, operates as a massive flywheel tending to smooth out swings of production and employment which if left to themselves might cause grave disturbance.

Healthy Unrest

THE cement industry, both producing and consuming, is beset with conflicting doubts in so far as specifications are concerned. Various signs of unrest were apparent at different times during the convention of the A.S.T.M. last week, but in the main they must be considered healthy. It was evident that some feel the revision of the standard specification for portland cement, which raises the tensile strength requirements, to be only a curtain-raiser for more general and radical developments. In a measure this feeling is supported by news of the reorganization of committee C-1, the cement specification body of the society, whose new set-up provides subcommittees to deal with new cements appearing on the market as well as to handle more effectively the current specifications on standard portland, high-early-strength portland and natural cements. Another indication of this state of unrest was the animated discussion, pro and con, which accompanied a suggestion that the cement committee develop more direct contacts with large consuming interests which have seen fit to depart from the standard specification and set up requirements of their own. Such a contact might show whether some of the departures have enough merit for inclusion in the standard specification, or whether they are unreasonable and of little value. Finally, the growing doubt concerning the value of the tensile test of mortar briquets, the basic test of the present standard specification, is significant. Reports which show that many laboratories are working on a substitute test, involving

compression specimens of plastic mortar in the shape of cubes or cylinders, were clear evidence of this doubt. Evidently the field of cement is likely to see important developments in the near future. It is equally clear that specification bodies are scheduled for some active days and perhaps some sleepless nights in keeping the cement industry on an even keel with full speed ahead.

Cleveland's Regional Road System

THE regional highway plan of Cleveland and its bordering communities in Cuyahoga County commands special notice at this time when the civil engineers of the country are assembling to meet in convention in the Ohio metropolis. While less easily grasped visually than are the works of the city's great union railway terminal, the new highway system has a rank not at all inferior among great engineering undertakings and is as deserving of study by the visiting engineers. Measured in money, the regional highway system represents an expenditure of between sixty and seventy millions. Its undertaking is based upon one of the most thorough quantitative investigations of traffic conditions and demands ever conducted. A nation, a state, a county and a city have supplied their engineering talent in developing the factual survey and in planning from the facts. The result is a highway system under construction that has many lessons for the public roads official and regional planning engineer. In his article in this issue, J. Gordon McKay, under whose direction the improvement is being carried out, recites the history of the Cleveland regional highway plan and tells the difficulties and progress of the work. It is a notable story and deserves close attention.

Practical Confidence

THE celebration held in Pittsburgh on Monday marking the completion of the new eleven-story all-welded Westinghouse laboratory draws attention to the remarkable program of structural welding that this company is carrying out. Other electrical equipment manufacturers are fostering comparable programs, but for the moment attention is focused on Westinghouse. In addition to the new laboratory, which with its eleven stories and 2,000 tons of steel is the tallest and largest welded building yet built, there are under construction on adjacent plots in the same plant a 450-ton mill building and a 150-ton parking garage, the latter of novel design requiring extensive crossbracing and special details. With the completion of these structures there will be 7,000 tons of steel in welded buildings at the East Pittsburgh plant of the company. Such practical confidence in welding is no doubt a natural result of a manufacturing program that utilizes 1,500 tons of welded steel a month in motor and generator parts. Yet one must admire the courage to extend welding to the new field of structural engineering in the face of the large body of remaining doubt and scepticism within the profession. The General Electric and Lincoln Electric companies are displaying similar courage in their building programs. Structural welding as a consequence is making rapid progress, as witness the current field-welding on fourteen-story buildings in Boston and Los Angeles and the recent announcement that work will soon start in a nineteen-story all-welded building in Dallas. When the history of structural welding is recorded, a decade from now, the vital part that the manufacturers of welding equipment played in its development should not be forgotten.

Materials and Industrial Economics

MIDSUMMER brings the large and always surprising meeting of men interested in materials of construction. Each year it directs renewed attention to the growing importance of materials problems in technological activities. For two decades the meeting of the American Society for Testing Materials has been the year's most characteristic as well as most weighty event in the engineering field, and therefore the scope of its proceedings claims the thought of every engineer who seeks to appraise current trends. It emphasizes the intimate relation between study of materials and the economic conditions of industry.

This year as in recent years the meeting is proof that more advance is taking place in the production and use of materials, and in the precision of knowledge concerning them, than in what may more narrowly be termed engineering method. To see this clearly, compare the meetings of civil engineering societies with those of the materials men: even allowing for the large number of engineering societies, it will be found that their activities show less creative work, less penetrating study and less progress. Perhaps there is less progress to be made—for engineering method started on its development much earlier than did scientific study of materials. Perhaps the obviously greater incentive and reward for improvement of material is a factor. But whatever the reason, the rate of advance in materials is at present superior to that in applied engineering knowledge.

Another observation presents itself together with the preceding. The study of materials, of their production and properties, has speeded up sharply in the last few years and appears to be still accelerating. The latter tendency is reflected in the growing number of contributions in old fields, the number of new fields to which exact quantitative investigation is finding application, and the extent to which new avenues of inquiry are opened up by completed studies. The general picture is that of a field of labor having future opportunities many times greater than those yet realized.

At the meeting last week no fewer than 91 papers were presented—a number almost oppressive, the more so because some of them represent a prodigious amount of experimental work and require patient, careful study for comprehension. They included 37 papers on metals, 20 on cement and concrete, 3 on brick, slate and tile, 17 on paints and oils, and 9 on textiles, paper, rubber and wood, besides a few of miscellaneous character. It is evident that the major materials of construction retain a dominant position but that many other substances and products are included. Materials study is making its way into fields which in the past were closed to it. And it is growing in intensity of cultivation as well as in range; new qualities are recognized, methods of measurement become finer, and laboratory results are better coordinated with service needs.

As a result of keener investigation of materials and more accurate measurements of properties two other phenomena appear. First, industrial production is increased in both scope and perfection—consider only the field of alloy steels. Second, greater precision is attained in adapting material to service—this is the direction of the present great advance in the field of concrete, for instance. Not only do such changes influence the power of engineering but they have a profound effect on the economics of industry. It is these economic effects that deserve specially thoughtful consideration.

Recently a distinguished economist pointed out that the rate of growth of the world's business—the quantitative measure of its production and commerce—is steadily decreasing and has been decreasing for many decades. His observation agrees with the general experience that industrial competition makes heavier demands as time goes on. It calls for higher efficiency of industry through better knowledge derived from scientific study. Obviously, research into materials leading to more precise appraisal of their properties and utilization is a key element of this study. Herein lies the motivating importance of the work exhibited in last week's meeting.

Study of materials is certain to continue its growth and embrace still wider circles. No longer can the individual producer decide for himself whether he shall enter into it; the progress of his competitors makes it imperative that he join. Nor is it the choice of the individual industry, since no industry today is free from the competition of others; it must keep pace with them if it would survive. Whether a material be old as bronze, masonry and iron, or new as synthetic plastics and rubber, it can assure itself of lasting position against competition only through continued research.

The Southfield Sewer

THE study being made in Detroit of the present condition of the Southfield Road sewer, treated elsewhere in this issue, leads inevitably into considerations which are not purely engineering in nature. The exigencies of changing political régimes, the handicap of having to do important engineering work with a non-technical staff, the summary dismissal of the city engineer, his subsequent reinstatement by the civil service commission, and the avowed enmity of the new commissioner of public works toward the city engineer, all enter the picture.

A committee of engineers is engaged in determining the causes of the failure and recommending methods of reconstruction. It has been given the further commission of fixing responsibility. In the electric atmosphere of Detroit one feels that this added duty is the most important.

That the quality of workmanship and material entering into the construction of the Southfield sewer is unsatisfactory cannot be questioned. That the designs prepared by the city engineer were adequate, if the necessary assumptions as to quality of material and workmanship had been complied with, has not been doubted. That the supervision of construction left much to be desired is evident. In Detroit this latter task was delegated to a department composed of non-technical men—men whose honesty and sincerity have not been questioned, but men who make no pretense at being engineers, and, most important of all, members of a department which is not considered to be an engineering organization. Engineering societies and others have repeatedly tried to correct this condition, but in vain.

Fixing responsibilities entails work that is highly judicial in character. If the cause of the failure was faulty construction methods, responsibility must then be fixed as between contractor and city. If the inspection service is blamable, how far back up the ladder of authority the search for culpability go? Chiefly, however, the thing to be determined is whether the blame lies on individuals or on the organizational system under which Detroit builds its municipal work. Defects in organization that lead to confusion of responsibility or authority are an insidious evil, often far harder to correct than incompetence or error of individuals, especially under political administration. Such are the questions which the committee will have to ponder and decide before writing its report. Unless they receive an effective answer, the inquiry will be in large part fruitless.

The Sanitary District Reports

WHATEVER charges may be laid against Chicago by those who have long been fighting the lake diversion, it is able to deliver completed structures on time. The first semi-annual report on construction progress and diversion, presented to the supreme court on July 1, brings this to light. Intended for the information of legally trained minds and dealing with highly complex structures, operations and finances, the report presents a concise, clear statement of the situation as of July 1.

Plants put into operation by the Sanitary District now handle one-quarter of all wastes; this is 8 per cent more than on the day the decree was signed, two months ago. The net diversion of lake water has been cut to 6,500 sec.-ft., as decreed.

Unfortunately, adequate finances for work beyond the fiscal year are not in sight. The state in 1928 insisted that district bond issues be approved by the people, and the state knows full well that the people have stopped voting for bonds in Chicago. Last year the district, by the questionable procedure of adding many legislators to its payroll, induced the state legislature to authorize an issue of $27,000,000 without referendum, but another appeal to the state in May fell on deaf ears. In consequence next fall a referendum will be taken. It is widely believed, and has been stated openly, that the reason for taking away the power of the district to issue its own bonds without referendum is the desire to drive the district's work and large patronage into the hands of state officials.

Thus do the engineering, financial and local political aspects of the Chicago sewage-disposal situation appear at present. The engineers are able to do their part if finances are available, but they are helpless without money. Finances depend so thoroughly on politics that almost anything may happen. Strong, steady hands are needed to guide the project through to success. If the politicians will listen to the engineers, who have on more than one occasion indicated a clear-cut procedure, no one will be disappointed, nor will Chicago default.

Volume 105—*Engineering News-Record*—Number 1

Engineering News-Record is a consolidation of Engineering News and Engineering Record, effected in 1917.

Engineering News as founded in 1874 by George H. Frost, as The Engineer and Surveyor, which title subsequently became The Engineer, Architect and Surveyor, then Engineering News and American Railway Journal and finally Engineering News, under the successive editorships of D. McN. Stauffer, Arthur M. Wellington and Charles Whiting Baker.

Engineering Record was established in 1877 by Henry C. Meyer as The Plumber and Sanitary Engineer. The name was subsequently changed to The Sanitary Engineer, Engineering and Building Record, and finally, to Engineering Record. During his ownership of the paper Mr. Meyer was directly responsible for the editorial policy. John M. Goodell became editor in 1902, and was succeeded in 1913 by E. J. Mehren.

The Contractor was consolidated with Engineering News-Record in 1918.

E. J. Mehren became editor of Engineering News-Record at the time of the consolidation in 1917, and was succeeded by the late Frank C. Wight in 1924. In July, 1928, F. E. Schmitt was appointed editor.

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Fabricating Fascine Mattress for Mississippi Revetment

Fascines of Willow Brush Laced Together Side by Side With Wire Cable—Mat Structure and Fabricating and Sinking Procedure Described as Employed in Middle and Upper Delta Reaches of the Mississippi River

THE construction of fascine-mattress revetment in the upper delta reaches of the Mississippi differs widely from the construction of framed-mattress revetment in the New Orleans district as described in *Engineering News-Record*, May 1, 1930, p. 720. Except that willow brush and poles are used for both types of mattress the two are unlike in structure and fabrication, and differ entirely in the general construction plan which is pursued. The fascine mattress is constructed

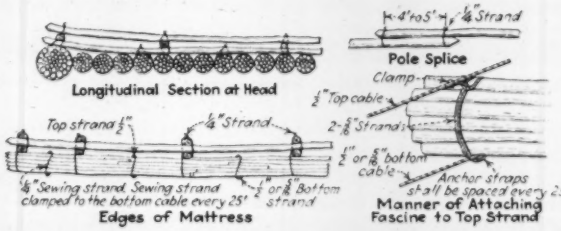


FIG. 2—STRUCTURAL DETAILS OF FASCINE MATTRESS

FIG. 1—MACHINE FOR TYING WILLOWS INTO FASCINE

afloat at the place where it is to be sunk. The materials are brought to the work by barges and all construction operations are conducted from a barge plant moored at the bank. The mattress structure consists of wire-bound bundles or fascines, of willow brush, strung side by side on wire cables and stiffened on top by lines of poles crossing the fascines and fastened to them. As the mattress is constructed it is anchored upbank by wire cables, and then is sunk by loading it with stone.

In general, fascine-mattress revetment has been constructed entirely by the government engineers with hired labor. A plant investment is required which few contractors are willing to undertake without reasonable assurance of continued work. This assurance has not been possible in the past, but with the new plans for superflood protection it is hoped that contract construction can be established. With their long experience, the government forces have developed special plant layouts and a very perfect construction technique. The following description of mattress structure and construction methods is prepared from information furnished by the government engineers and obtained from inspection of revetment operations in the Memphis district.

Fascine Mattress Structure

A section of fascine mattress is normally 1,000 to 1,200 ft. long alongshore, and is from 150 to 300 ft. wide outshore, the width being determined by the underwater bank conditions and the width of protection deemed necessary at the locality. The general rule for width is that the mattress shall cover the bank from the water line to the foot of the underwater bank slope and then extend 50 ft. riverward. Continuous revetment is formed

FIG. 3—MATTRESS HEAD TIES TO MOORING BARGE

by constructing one mattress following another with a lap of 15 ft., and complete revetment includes an upper-bank concrete slab and a riprap connection between the edges of the mattress and the slope paving as shown by Fig. 11.

The mattress is made up of parallel fascines or hooped bundles of willows, extending across the mat and normal to the riverbank. Each fascine is at least 16 in. in diameter after being tightly compressed and bound by tie wires, and is as long as the mattress is wide. The parallel fascines are laced together by wire strands and cables. The arrangement of the butt and top ends of the willows are such as to effect uniform strength throughout the fascines. Details of this structure are shown in Figs. 2, 3, 4 and 5. These vary somewhat under different constructors but the general form of structure remains the same and is as follows:

A section of mattress begins with a large fascine called a header and ends downstream with another large fascine called the tail. Both are built of large poles lapped and bound together into a compact, strong cylinder. The header is 3 ft. in diameter and to it are fastened all the mooring and other lines which hold the mattress in position while it is being woven and sunk. To it also are fastened the longitudinal mat cables which extend under and over the fascines for the full length of the mattress and are fastened to the tail fascine, which is 2 ft. in diameter. The mat cables are spaced not less than 8 ft. apart across the mattress, the exact spacing and the number of cables depending on the width of the mattress and on current conditions. The top cables are directly over the bottom cables, and both are fastened at intervals to the mattress by the fascine ties.

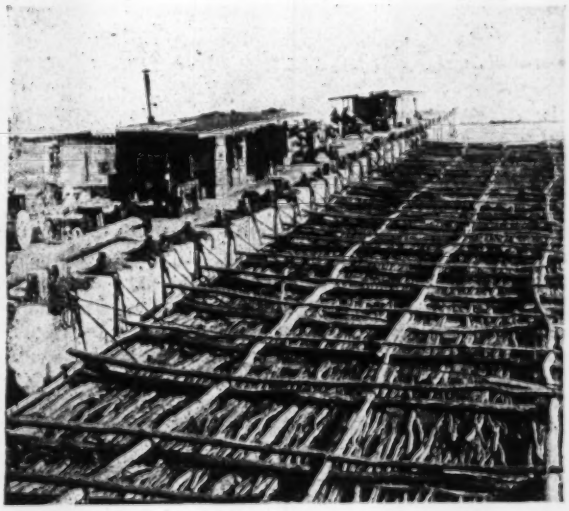


FIG. 4—POLE CRIBS RETAIN STONE BALLAST

The cables complete the tying together of the fascines to form a mattress. Strength and stiffness are then added by longitudinal poles laid on the fascines and wired to them along each cable and by transverse poles laid on the longitudinal poles at 40-ft. intervals and wired to them at intersections. These poles are lapped and fastened together at the laps. In a 90-ft. zone at the head of the mat and in 24-ft. zones along the other three mat edges, additional transverse poles are laid 8 ft. apart and wired to the poles underneath. The purpose of these poles is to form shallow cribs to hold the stone which sinks the mattress. The pole structure is indicated by the drawings of Fig. 11 and the views Figs. 3, 4 and 5.

FIG. 5—PLACING LONGITUDINAL POLE STIFFENERS

Except for the timber parts, mattress materials are the ordinary commercial galvanized-wire cable and clips. The willows have 2- to 6-in. butts and are specified to be 30 ft. long and not over 90 days old; they are not trimmed. The poles are trimmed willow or cottonwood, 30 ft. long and not more than 90 days old. The stone for sinking the mat is required to be of hard, durable rock weighing not less than 140 lb. a cubic foot. Sizes ranging from 10 to 100 lb. are specified, with not more than 20 per cent weighing less than 25 lb. and not more than 20 per cent weighing more than 75 lb. The growing scarcity of willows is restricting selection, but the purpose is to use tall straight brush with a good length of trunk and an evenly branching top. The perfection of fascine form and structure depends largely on the quality of willows.

Mattress Fabrication

Fascine mattress is fabricated afloat and virtually over the position in which it is to lie when sunk. Cut willows therefore must be shipped in, and this calls for a considerable fleet of barges. In fact, a rather large plant is required for the operation throughout. As this plant investment has been the main obstacle heretofore to contract construction, an approximate plant summary based

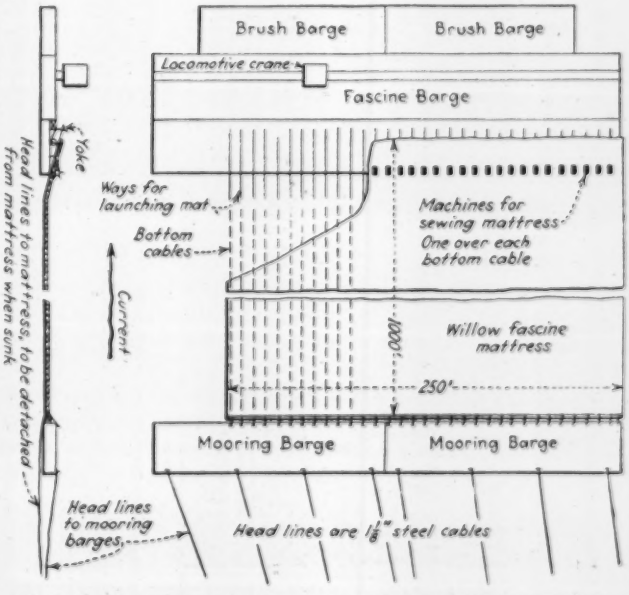


FIG. 6—PLANT LAYOUT FOR FABRICATING MATTRESS

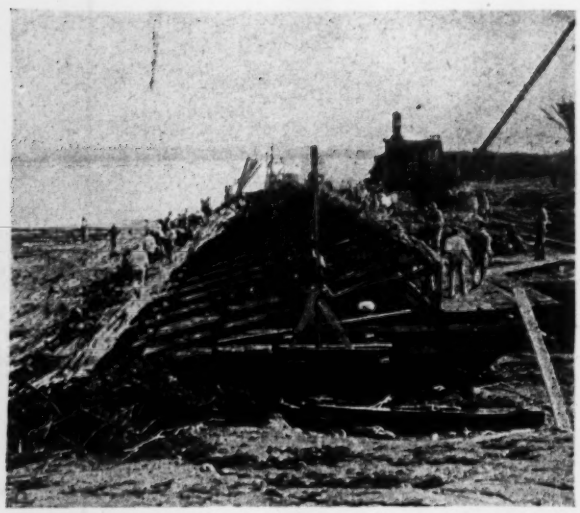


FIG. 7—FASCINE PLANT IN OPERATION

on practice in the Memphis district is pertinent. This summary includes all the plant for a complete revetment operation which includes upperbank paving with concrete as well as the mattress weaving and sinking operation described here.

Normally there are four quarter boats housing and messing about 100 men each and providing office quarters, and the mattress-weaving plant shown by Fig. 6. This consists of the fascine barge with a small locomotive crane for unloading brush barges and two mooring barges with mattress-mooring lines and steel cable headlines for shore anchorage. Six to eight barges and a towboat are required for brush and stone. Bank grading requires a hydraulic grading outfit consisting of a pump barge furnishing 175-lb. pressure and an equipment of hose and nozzles. For bank paving, which usually follows some time behind mattress sinking, there are two quarter boats, a sand and gravel digger, four to six steel gravel barges, a steamboat, two to four cement barges and a concrete-mixing and paving plant. All these items make an imposing plant for a contractor to provide and present enough reason for his hesitancy in competing for work of rather uncertain volume and location. An estimate of the plant cost reaches $600,000 in round figures.

The arrangement of the weaving plant is shown by Fig. 7. As the mooring barges have to hold the fascine plant and brush barges as well as the pull of the mattress, the shore anchorages are made very secure as shown by Figs. 6 and 8. The mattress fabrication begins at the mooring barges (with the fascine barge pulled close) with the construction of the header fascine. This is hung afloat by lowering lines from the bitts of the mooring barges as indicated by Figs. 3 and 4, and to it are attached the longitudinal mattress cables, the lower cables running to reels on the fascine barge. With the header as an anchor, one standard fascine after another is fabricated and laced to the preceding fascine, the fascine barge being slacked off downstream as the mattress grows longer. At about every 70 ft. the shore edge of the mattress is anchored by steel cables running upbank to deadmen. When the concrete bank paving is laid, these cables are embedded to give them permanent fastening.

The fascines are fabricated on the ways of the fas-

FIG. 9—LOADING WILLOWS INTO FASCINE YOKES

FIG. 10—YOKEFUL OF WILLOWS SLIDING DOWN WAYS

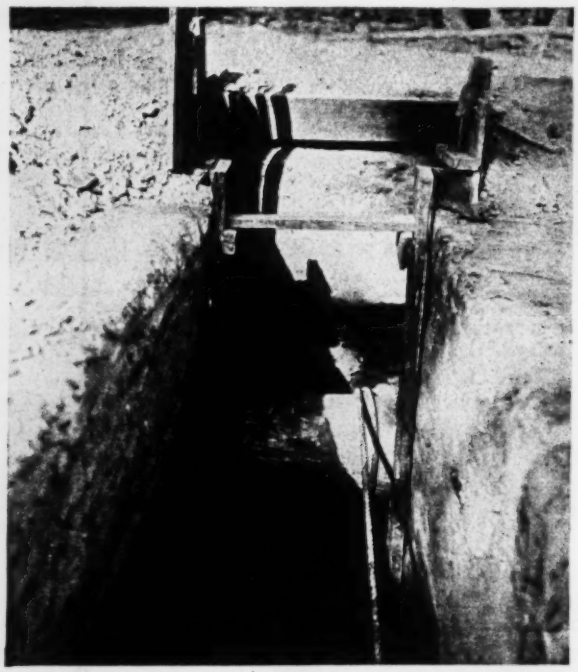


FIG. 8—DEADMAN FOR MOORING BARGE HEAD LINES

cine barge. These ways are shown by Figs. 7 and 10. At their upper ends (Fig. 10) they have hinged iron bars which, when set upright and latched, form with the ways a Y-yoke. In this yoke the men, taking willows from the fascine barge deck, where they have been laid down from the brush barges by the locomotive crane, place the amount of willows required for a fascine (Fig. 9). The levers are then tripped and the yokeful of willows slides down the ways as shown by Fig. 10. At the bottom the willows are looped into the sewing strands and drawn into a compact bundle or fascine by the hand winches or sewing machines (Fig. 1). There is one of these machines over each bottom mat cable, and Fig. 13 shows a group in operation.

Except for the work of the locomotive crane every operation in mattress fabrication is manual. With experience the men become notably skilled in their tasks and the successive processes assume a remarkably clock-like regularity. Generally two ten-hour shifts a day are worked, the operations at night being illuminated by electric or gas lights. The men are housed and fed on quarter boats and on these the order and cleanliness are

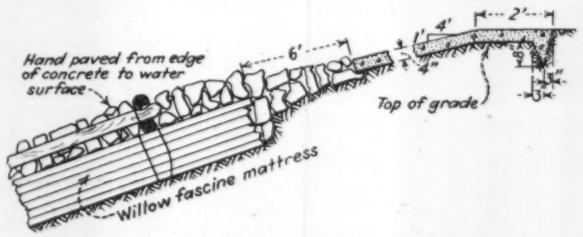


FIG. 11—JUNCTION OF FASCINE MATTRESS AND BANK REVETMENT

matters to be observed even by one familiar with the excellence of the housekeeping in the best construction camps.

Mattress Sinking

With the completion of the tail fascine of the mattress and after the mat cables are fastened to it and all the poling for stiffness and cribs are in place, the fascine barge is pulled clear and the mattress is afloat, held by the bitt lines to the mooring barges and the upbank anchor cables. Frequently some ballasting has been done before the mattress is entirely completed, but it is not until then that sinking is really begun. The procedure is indicated by Fig. 12: (1) The downstream 800 ft. is ballasted by working from the stone barge shoreward

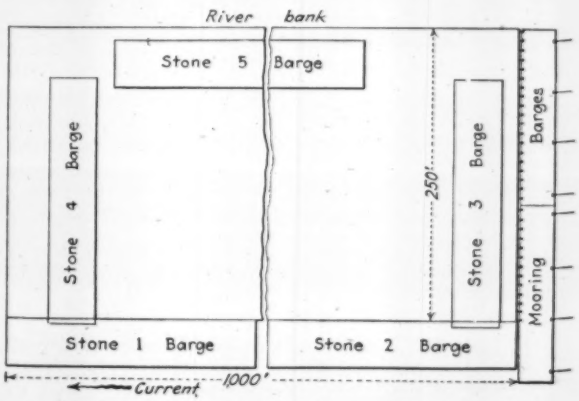


FIG. 12—PLANT ARRANGEMENT FOR SINKING MATTRESS

FIG. 13—GROUP FASCINE TIERS AT WORK

from position 1. (2) The upstream 200 ft. is then ballasted from barge position 2 and stone is placed on the mooring barges to help sink the head. The head is then sunk to a depth of 10 ft. and held there by the lines from the mooring-barge bitts. The stone barge is then moved into position 3 over the mat. (3-4) The head is sunk to the bottom and the barge is slacked off downstream to position 4, completing the sinking of the mat as it moves. (5) The inside or shore edge of the mat is then sunk from barge, position 5.

The upper bank revetment is a separate operation with another plant and crew. When completed it holds the mattress firmly to the shore.

Acknowledgment

The mattress construction described was at Bullerton Bar, Ark., in the Memphis district, Lieut. Col. F. B. Wilby, Corps of Engineers, district engineer, and Major E. C. Kelton, Corps of Engineers, engineer Second Field Area, in direct charge.

Long Cables Cut to Predetermined Length for River Crossing

Erection of a 132-kv. transmission line across the Mississippi River at Baton Rouge, La., required cutting the cables to exact length at the factory so they could be speedily placed without interference with river traffic. The line consists of eighteen conductor cables and six ground wires, each cable consisting of eleven strands of aluminum wire 0.165 in. in diameter over a core of nineteen steel wires of 0.087 in. diameter. The main river span is 3,750 ft. long, the east anchor span is 1,024 ft. and the west anchor span is 900 ft. The main towers are 425 ft. in height, with crossarms 108 ft. long, providing a clearance of 150 ft. above high water. Because each anchor tower is also an angle tower, set on a skew, thirteen different lengths of cable were required. The cables were cut to a length to reach from one anchor tower to the other, figured for a 6,500-lb. tension with a 188-ft. sag in the main span at 70 deg. temperature. Because there was no way to stress the cable at the mill, it was necessary to calculate the unstressed length, measure the cable carefully and attach the dead-end anchors before shipping. The accuracy of the calculations is shown by the fact that after erection the sag of all cables varied less than 18 in. from the theoretical sag. The transmission line was built by the Stone & Webster Engineering Corp. for the Baton Rouge Electric Co.

Welded Trusses Developed for Bridge Floor Reinforcing

By H. M. Bringhurst
Consulting Engineer, Macomber Steel Company, Canton, Ohio

First Adaptations Are on the Ohio River Bridge at Louisville and the Ambassador Bridge at Detroit

THE roadway slab reinforcing used on the new bridge over the Ohio River at Louisville, Ky., and on the Ambassador bridge at Detroit is an interesting example of truss-type reinforcement, and represents the first use of arc-welded material on bridges of this size. Following the use of a truss-type reinforcing system on the Philadelphia-Camden bridge and the use of I-beams from the web of which large triangles were punched, on the Tacony-Palmyra bridge, the Macomber Steel Co. began a series of tests to determine the possibilities of an arc-welded section. The section desired was one that would bond well with the concrete, that would be without flat surfaces from which the concrete could spall, that would function as a true truss up to the yield point and that would have sufficient lateral stiffness to make handling easy on the job.

The sections finally determined upon for the Louisville and Ambassador bridges are shown in Fig. 1. The

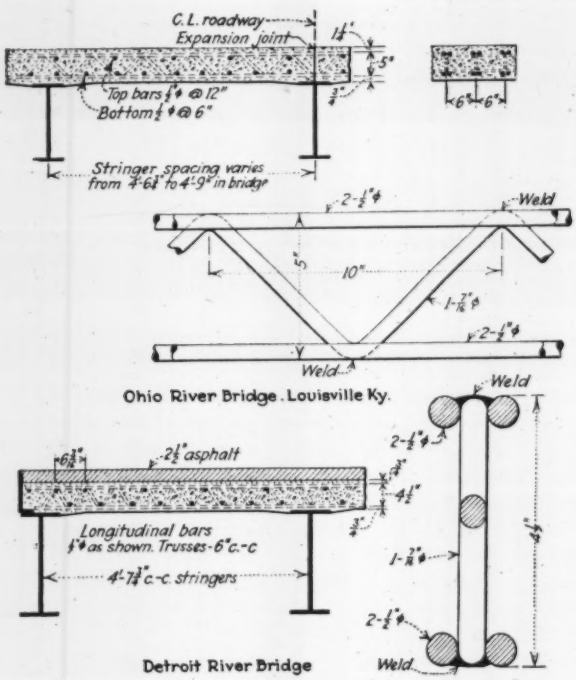


FIG. 1—WELDED SLAB REINFORCEMENT USED IN TWO LARGE BRIDGES

radius of gyration of these sections about the vertical axis is high, 0.48 in., and the manufacturing process is such that the depth, bar sizes and panel length can be varied to meet any condition.

The tests on the Louisville sections were conducted at the Pittsburgh Testing Laboratory. The samples were tested in direct bending under a single concentrated load at the center of a 4-ft. 2-in. span. Deflections were taken at the center and quarter points with Ames dials. Tests also were made on extremely short spans to stress the web members and to determine the effect of splicing the web.

The results of the tests showed almost perfect elasticity of the trusses. The average residual deformation of the specimens was as follows:

Load in Pounds	Deflection at Mid-span in Inches	Load in Pounds	Deflection at Mid-span in Inches
0	0	2,500	
1,000		0	0.006
0	0.003	3,000	
2,000		0	0.012
0	0.005		

The tests on the 4-ft. 2-in. span all failed from buckling of the top chord. Specimens tested with short spans failed from buckling of the web. No welds failed in any test. After failure occurred in the testing machine, the welds were individually tested with a pinch

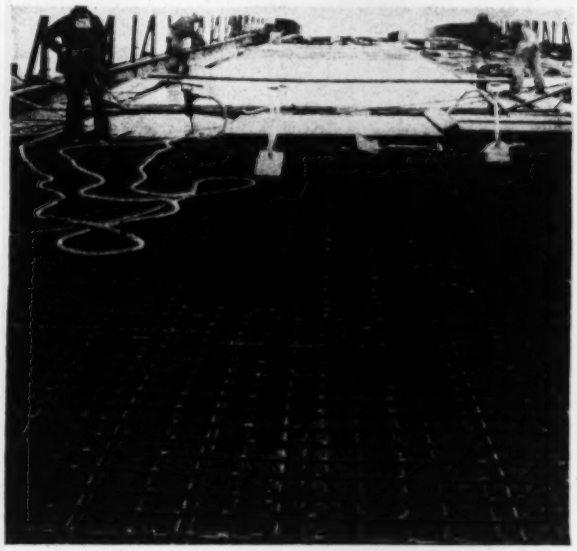


FIG. 2—THE WELDED TRUSS REINFORCEMENT IN PLACE ON THE OHIO RIVER BRIDGE AT LOUISVILLE

bar. In every case the weld remained intact until after the bars were badly twisted and distorted.

The bars are furnished by the mill in coils and are straightened at the plant in straightening machines, in order to remove the mill scale. The webs are bent on a compressed air bending machine and are spliced to facilitate handling. The bars are then assembled in a jig and each joint is electrically arc welded by hand. Special care is taken to avoid distortion from the application of the heat. After the truss is removed from the jig each joint is tested with a pinch bar. At irregular intervals, trusses are tested to destruction as an additional check. All of the reinforcing trusses of the Louisville bridge were made by the Macomber Steel Co. On the Detroit bridge part of the trusses were made by this company and the remainder by the McClintic-Marshall Co. The latter trusses are of identical design but are fabricated by pressure welding instead af hand welding.

Acknowledgment is made of the co-operation of Modjeski, Masters & Chase and also of G. B. Woodruff, of that firm, in developing this reinforcing truss. Supervision of the tests and the shop inspection of the trusses was handled by S. R. Rusiackus, of the same firm.

What Share of Flood-Control Costs Shall Federal Government Assume?

Rational Policy Must Include Worthwhileness of Projects and Equitable Assessment of Those Benefited—Paying Fixed Proportion Only Will Preclude Raid on Treasury

By E. W. Lane
Hydraulic Engineer, Denver, Col.

Emory Wilson Lane is one of the younger engineers with Middle West training (Purdue 1912, Cornell 1914) and subsequent national and international experience. His first five years after graduation was with the Morgan Engineering Co. during the formative period of the Miami Conservancy District. Construction of four aviation camps in the U. S. Army claimed his attention in 1917 and 1918. He was with the U. S. Bureau of the Census on drainage in 1920. The years 1920 to 1923 found him in China as consultant for the Kiangsu Grand Canal Improvement Board and Nantung Shore Protection Bureau. Thence returning to the Morgan Engineering Co., he was engaged on the Pueblo conservancy work. In 1925 and 1926 for the Joint Board of Engineers of the St. Lawrence Waterway he studied regulation of the Great Lakes levels. His more recent work has been with the U. S. Engineer Corps as hydraulic engineer for the spillway and diversion boards on their studies of Mississippi flood control. Later he was transferred to Washington on the adopted plan. Many of the ideas set forth in this article, he states, were evolved during his work with C. R. Pettis, lieutenant-colonel Corps of Engineers, U. S. Army, in the Baltimore district office. Just now Mr. Lane is in the Denver office of the U. S. Bureau of Reclamation at work on the engineering of Boulder Canyon dam. —Editor.

Federal Policy on Flood Control

Two principles must form the basis of flood-control policy.

The first is that a project is not sound unless the benefits which will result from the construction are greater than the cost.

The second is that the cost of flood-control works should be equitably divided among all the beneficiaries.

RECENT events emphasize the necessity for a federal policy on flood control. Appropriation of federal funds for control of the Mississippi River, the proposal that the government provide funds to prevent a repetition of the two Lake Okeechobee disasters, and many more urgent demands for federal funds for the construction of flood-control works argue in the same direction. The last two decades have witnessed the gradual abandonment of the original policy, and none has been set up to take its place. Will a new one be formulated along logical lines at an early date, or will it be worked out only after the scramble for federal support for unsound projects and the consequent log-rolling has so disgusted the general public that a proper policy is demanded?

Former Policy

Until a few years ago federal policy was based on the assumption that flood-control works are for the benefit of individuals and therefore are not a proper field for the expenditure of federal funds. When flood-control work was carried on by government agencies it was on the ground that the works were primarily for the benefit of navigation. Probably the earliest excursion of the United States government into the field of flood control was in the construction of levees along the Mississippi River. Originally it was the view of those in charge of this work that levees were a necessary part of the improvement of the river for navigation and that any flood-control benefit resulting from them was merely incidental.

The results of the construction of levees soon proved that they were not a material aid to the improvement of the channel of the river for navigation, but construction with federal funds was continued and the subterfuge of the benefit of levees to navigation maintained long after its essential falsity was known.

In 1917, however, the flood-control act was passed, which provided that the Mississippi River Commission might build levees for flood control if local interests should pay not less than one-third their cost. This was a straightforward meeting of the local problem, but it did not attempt to establish a national policy. Prior to 1927 other flood-control projects had been brought to the attention of various agencies of the government which this law did not cover. Studies were made for flood control at Pittsburgh, where the claim was made that the reservoirs proposed would improve navigation by increasing the low-water flow of the Ohio River, but no federal assistance was forthcoming, since the cost was deemed excessive. Flood-control investigations have also been made for Wilkes-Barre and other places, but no federal expenditures were recommended, on the ground that no national interest was involved.

On Jan. 21, 1927, an act was passed appropriating $7,000,000 for "examinations, surveys and other investigations that may be required of those navigable streams of the United States and their tributaries whereon power development appears feasible and practical, with a view to the formulation of general plans for the most effective improvement of such streams for the purpose of navigation and the prosecution of such improvement in combination with the most efficient development of the potential water power, the control of floods and the needs of irigation." The existence of this law is unknown to most engineers, and its far-reaching effects in all of these fields are not realized by them.

Under this act studies will be made by the War Department of the water power, navigation, irrigation and flood-control conditions of practically every river of importance in the country. As a result of these studies the interest of each community will be focused on its flood problems, and the relation of the federal government to the local situations will be emphasized.

Prior to the great Mississippi River flood of 1927

there was thus a weakening of the policy of federal aloofness from flood-control expenditures, though the policy was still maintained with the important exception of the Mississippi River. But the flood of 1927 on the Mississippi and its tributaries resulted in the abandonment of this long-established policy. The flood-control act of May 15, 1928, provides for construction of extensive flood-control works almost entirely at the expense of the nation.

At the time the act was passed a great demand arose for the appropriation of federal funds to alleviate the flood situation on Lake Okeechobee and the Mississippi tributaries. As part of the act Congress appropriated $5,000,000 for study of the flood problems of the Mississippi tributaries to supplement money already appropriated for studies of the water resources of various streams previously mentioned. The recent disaster on Lake Okeechobee with the loss of more than 1,000 lives further focused attention on the problems in that region and resulted in recommendations of federal expenditures for this project.

With federal assistance for the Mississippi River and Lake Okeechobee projects as a precedent, it may be expected that in two or three years, when studies on many rivers are completed and reports begin to come out in great numbers, pressure will be brought to bear at the same time on every Congressman who has one of these enterprises in his district, to secure appropriations for that project. The result will be a getting together of the large number of legislators interested to put through what promises to be the worst pork barrel in history. Normally only a few Congressmen have projects under consideration in their districts at any one session of Congress, and the remainder can have a restraining influence, but when this movement reaches its height the number without any projects to promote will be few, and unless a sensible policy of federal aid is worked out enormous and wasteful expenditures are sure to follow.

Fundamentals of Flood-Control Policy

There are two fundamental principles that must form the basis of any satisfactory flood-control policy. The first is that a project is not sound unless the benefits which will result from the construction of flood-control works are greater than their cost. This seems rather obvious but often on such projects only the roughest sort of comparison of benefits and cost is made, so rough that it may not even approach a proof of the essential soundness of the schemes. It is true, of course, that an actual evaluation of benefits (and often of the cost) is difficult, but a real effort should be made to arrive at them, even though the results must necessarily be approximate. It should be noted that the true cost not only is the actual money paid out in the construction of the works but includes the money value of any damage which may result from the plan, even though it may not be necessary to pay for this damage.

The second fundamental principle is that the cost of flood-control works should be equitably divided among all the beneficiaries. Such a division is secured when those benefited pay for the cost of construction in proportion to their benefits. In practice this is difficult to secure, but it is the ideal which should be striven for. Probably the nearest approach to the attainment of it so far achieved was on the flood-control works in the Miami Valley, centering around Dayton, Ohio, and on those for the protection of Pueblo, Col., which were carried out under the conservancy laws of their respective states. Even in these cases the ideal was not attained; the assessments were laid only against property actually in the flooded districts, while those living on the high lands paid only their pro rata share of the assessments against the city and county properties in the flooded districts, although the high-land dwellers unquestionably received other indirect benefits. Practical consideration must govern; the ideal should be attained as nearly as possible, without completely wrecking the project.

Benefits of Flood Control

It is therefore necessary to consider all the benefits which accrue directly or indirectly, for benefits may be received in a number of different ways. The hazard to the personal safety of the man who resides in the flooded district is reduced, and he is therefore obviously benefited. The benefit obtained by the owner of property within the flooded district is also obvious. Properties in the flooded district, however, are not the only ones benefited by flood control. Following a very severe flood there is a general depreciation in property values in the locality because of the slowing up of business activity and the hesitation of the industrial concerns and individuals who would otherwise have moved into the community. During the period of a flood considerable losses result to many of the individual and commercial organizations which are outside the flooded district but whose activities are interfered with by the disruption of electric power and water supply, street-car communication and other utility service. The interruption of the public water supply also involves considerable risk from fire and danger to public health. Individuals lose as a result of floods, but governmental units such as counties, towns and cities are also losers, not only by the flooding of their properties but by the depreciation of property values, reducing the value upon which they can assess taxes. In the same way the states within which the flood takes place suffer. Usually also the states expend considerable sums on flood relief. Somewhat similarly the federal government also is damaged.

The Mississippi River is a good example of the benefits that will result to the various interests from flood control. The losses to the individual owner of property within the flooded region from the great flood of 1927 are obvious. The indirect losses to those inconvenienced by the interruption of customary facilities was also great. The expenditures by towns, counties and states in the flood fight amounted to large sums. The reduction of the income from taxes to those public organizations and also to the federal government were likewise considerable. The federal government spent large sums in fighting the flood, in providing rescue facilities for the endangered people and in studying means of control for future floods. Prevention of such flood damages will be a benefit to all of these individuals and governmental units.

This is only an enlarged picture of what happens in every flood causing damage, the difference being that in the case of the Mississippi the losses were large, whereas in smaller floods their effect is likely to be obscured.

Equitable Distribution of Cost

The distribution of cost of flood-control works among all of these beneficiaries is a difficult problem. General principles only can be followed. It may be said that the criterion upon which the distribution of cost should

be made is that it divide into two parts in the proportion of the direct to indirect benefits.

Direct benefit should be assessed in proportion to individual benefits, and the remainder should be divided among the governmental units in the proportion which, collected as taxes through that organization's regular channels, would most equitably distribute the cost of the project among all those who would be indirectly benefited. The cost of flood control would therefore normally fall heaviest upon the individuals and private organizations directly benefited. Another portion would fall upon the local governmental units, city or town, county and state, and still another portion upon the federal government.

The benefits of a flood-control scheme depend upon so many intangible but nevertheless real factors that it would not be possible to make a rigid determination of the portion which the national government should pay. A study should be made of the problem, however, and the best possible figure arrived at. While it is true that the benefit of the government would be somewhat different in different cases, on account of the difficulty of exactly evaluating it, the best policy would be to pay the same percentage in each case.

Since the proportion paid by the other interests would normally be the major part of the total, it is believed that the carrying out of the project should in general be under local direction but that before agreeing to pay its portion the federal government should approve the plans from the standpoint of the economics of the situation and their sufficiency and efficiency. There may be cases where a greater degree of federal participation in the direction of the work will be desirable—for example, when the direct benefits all lie in one state while the works for flood control (dams) could be most advantageously constructed in another.

Since there would be no difference in the benefits that would accrue to the federal government between projects that lie entirely in one state and those that extend over more than one state, no distinction should be made between interstate and intrastate projects as regards the proportion which the federal government should pay in the cost of the work. There is no sound reason why the federal government should pay more for a flood-control project on an interstate river than for one entirely within a state.

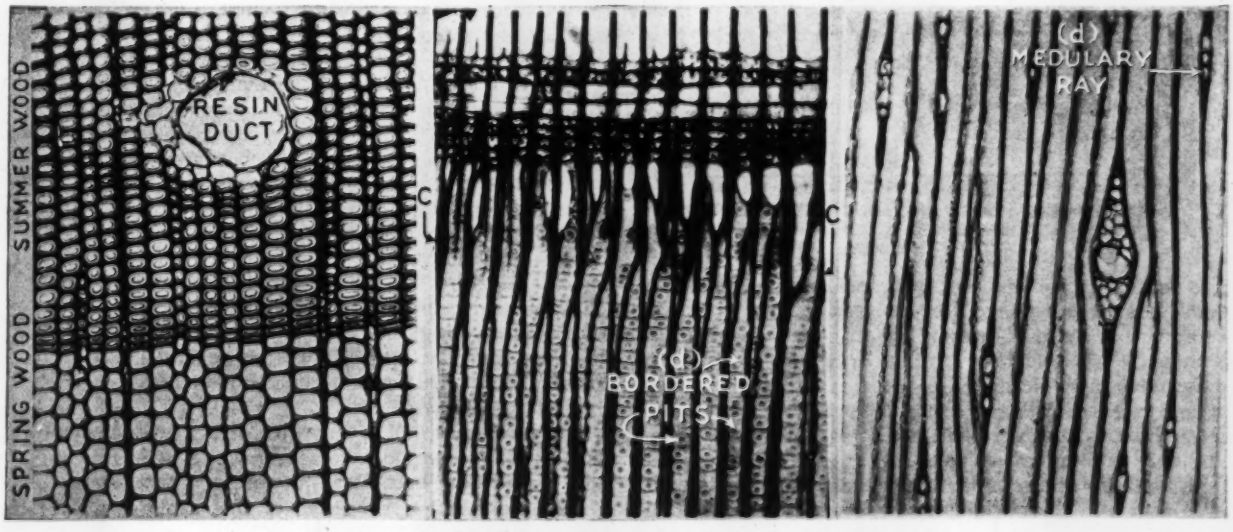
Conclusion

It is believed that if Congress should adopt the policy of paying a fixed proportion of the cost of local flood-control works, such proportional share of the benefits in all flood-control projects, the problem of federal appropriations for such works would be practically solved. For, since its portion would be a minor part, the other interests would not be willing to put up a major proportion for an unsound project. With the precedent set by the recent Mississippi flood-control act it will be difficult to establish such a policy, but as other similar appropriations are made it will grow increasingly difficult and unless a definite policy is adopted in the near future it will be well nigh impossible to prevent the grossest form of pork-barrel legislation.

Status of Creosoted Pole Practice

Abstract of paper by R. E. Meyers, International Creosoting & Construction Co., presented at a recent division meeting of the National Electric Light Association.

FACTORS in the trend toward the increased use of creosoted pine poles by the utilities include a change to the empty cell method, taking advantage of high-strength timber and pretreatment. In 1928 full-length treatment was given to 1,528,441 Southern pine poles. Butt treatment was given to 1,819,453 cedar poles of various kinds, mostly Western red. Chestnut poles to the number of 284,624 were treated mostly at the butts only, while 17,375 Douglas fir poles received full-length treatment. The 1929 figures, not yet available, will exceed these figures somewhat.



CELLULAR STRUCTURE OF PINE MAGNIFIED 250 DIAMETERS

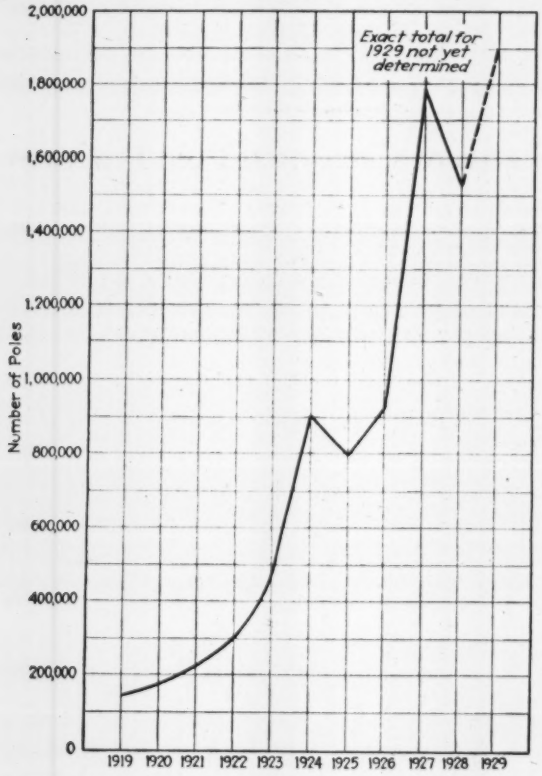
In the cross-section (left) the wood is shown composed of individual cells having a tube-like structure. The large spot in the upper summer wood portions on the illustration is a resin duct which carries and stores rosin in the living tree. During treatment the ducts act as important passageways for the preservative.

The lengthwise view (center) of the tubular wood cells indicates perfect interlocking of the two series of cells and is shown just above the center of the picture. The bordered pits (d) are minute openings in the cell walls—that is, valves by means of which the preservative moves sidewise from cell to cell during treatment.

The tangential section (right) again shows the tube-like wood cells lengthwise. In the empty cell treatment a large quantity of creosote is forced into these cells, giving a deep penetration. Toward the end of the process the excess preservative is withdrawn, leaving the wood cells partly empty. A gross injection of 16 to 20 lb. is obtained when only 8 lb. is left in the wood.

As to strength from actual pole tests, the American Engineering Standards Committee is conducting an intensive study which will give fiber strength of the pole woods. The U. S. Department of Agriculture (see Bulletin 158) has made tests on small clear pieces. They are considered the best authoritative published index to relative strength and are as follows: Taking Southern yellow pine at 100, Northern white cedar is 50.7, Western red cedar is 60.8 and chestnut is 68.8. In pole-line construction advantage is taken of the above relations by using smaller poles of the higher strength or by using longer spans.

Empty cell treatment is now almost the universal practice, the Bell system last year changing from 12-lb. full cell to 8-lb. empty cell. The latter method has been specified for several years by many utilities for traction, telephone, transmission and distribution line use. Deeper penetration, a more even distribution and a drier, cleaner



TREATED PINE POLES ARE ON THE INCREASE
Based on U. S. Department of Agriculture and Statistics.

pole results. One kind of treatment, rather than two kinds, has its advantage for the manufacturer. More creosote is needed, however, where lines go through swamps or are located in tropical climates.

Termites or white ants are making increasing inroads on untreated pole lines. Only three states, North and South Dakota and Vermont, are free from these pests. Not only are untreated poles damaged (at Beaumont, Tex., collapse occurred in three years) but the line of poles acts as a direct highway by which the infestation spreads from one section to another. Creosoting protects poles for at least twenty years.

Less checking at the top, better drainage and less loss of preservative through evaporation is obtained by making the roof (top) of poles with a 20 to 30 deg. pitch.

In the merchandising set-up the utility now can buy hand to mouth, since it is possible to get immediate shipments. The modern creosoter not only has stock on hand but can frame and treat any ordinary order within 24 working hours.

In addition to framing before treatment, much pretreatment is also practiced. About 4 lb. is used, and the pole can then go back into the yard protected against season decay and on order be retreated to customer's specification.

Studies of Biochemical Oxygen Demand of Trade Wastes

Tests at Paper Mill, Milk Plant and Beet Sugar Factory Show That a General Curve for Waste Oxidation Is Not Possible

By E. F. Eldridge
Engineering Experiment Station, Michigan State College, East Lansing, Mich.

THE biochemical oxygen demand test is a determination of the amount of oxygen required by aerobic bacteria to oxidize the unstable organic material in a sewage, trade waste or stream. The test is invaluable for the determination of the degree of pollution of a stream and for the comparison of the relative strength of wastes. To aid in the better interpretation of the results obtained by the test, a study has been made of the oxygen demand of some trade wastes and curves have been drawn showing the rate of oxidation.

The length of time required for the incubation of the samples is one of the outstanding objections to the present method. The time required for the complete oxidation of the unstable materials depends upon the type of compounds in the waste examined. Twenty days has been adopted as the period required for the almost complete oxidation of sewage dilutions when incubated at 20 deg. C. Since this is too long a period for the majority of workers to await for results, a curve has been used for the calculation of the total demand from the results obtained by incubation over a shorter period. ("Standards Methods of Water Analysis," A.P.H.A.) It is common practice to use the five-day demand for these calculations. This five-day demand, according to the formula, represents about 68 per cent of the total.

More recent work has shown that this formula for the rate of oxidation cannot be entirely depended upon, especially where industrial wastes are concerned. G. E. Symons and A. M. Buswell (*J.I.E.C.*, Analytical Edition, p. 161, July 15, 1929) have determined the curves for some pure substances. Their work shows that carbonaceous matter is not completely oxidized even in 30 days, but that the rate follows the general curve mentioned above. Nitrogenous compounds are completely oxidized in 30 days.

For the studies outlined in what follows samples were taken from the various sources of waste at paper mills, milk plants and beet-sugar factories. Five series of samples were taken from each of the plants mentioned. These samples were incubated at 20 deg. in various dilutions and the dissolved oxygen was determined according to the Rideal-Steward modification of the Winkler method. The results of each of the five series were averaged and the results plotted as shown herewith.

Paper Mill Wastes—The samples for this work were taken from a mill which used wood pulp for the manu-

facture of paper. The principal wastes consist of the white water from the beaters and paper machines and the sulphite liquor from the digestors. Fig. 1 shows the curve for the oxidation rate of each of these wastes. The white water contains principally the fiber which is lost from the machines. The sulphite liquor contains excess sulphite and all of the organic material dissolved from the wood. The latter is very high in this polluting material and oxidizes rapidly. The curve for the white-water oxidations shows a slight tendency toward a two-stage oxidation. Whether or not this is indicated by the double curve in the sulphite series is a question, as the second curve occurs early in the period of incubation.

Milk Waste—The milk waste used for these experiments was taken from the sewer outlet of the Michigan State College dairy. This waste contains principally the washings from the milk cans and utensils and from the butter. The waste was fresh when sampled. Fig. 2 shows the two-stage oxidation, the carbonaceous matter representing the first stage and the nitrogenous the second. The first stage follows the formula quite closely. The second stage takes place between the eighth and tenth days. This is somewhat sooner than was expected, which may be due to the fact that the milk sugar which comprises the most of the carbonaceous matter oxidizes very rapidly, especially in solutions of a rather high pH. The pH of the incubations was about 7.6.

Sugar-Beet Factory Wastes—The wastes from a sugar-beet factory operating a full house come from five principal sources; the flume water, the battery wash water, pulp press water, lime pond overflow and Steffen waste. Five different samples were taken from each of these wastes and their rate of oxidation determined.

Flume water is large in volume, but low in unstable materials. This water is used to float the beets into the factory and to wash them. It contains principally dirt, beet tops and roots, but very little matter in solution. The curve for the oxidation of this waste shows a tendency toward two-stage oxidation.

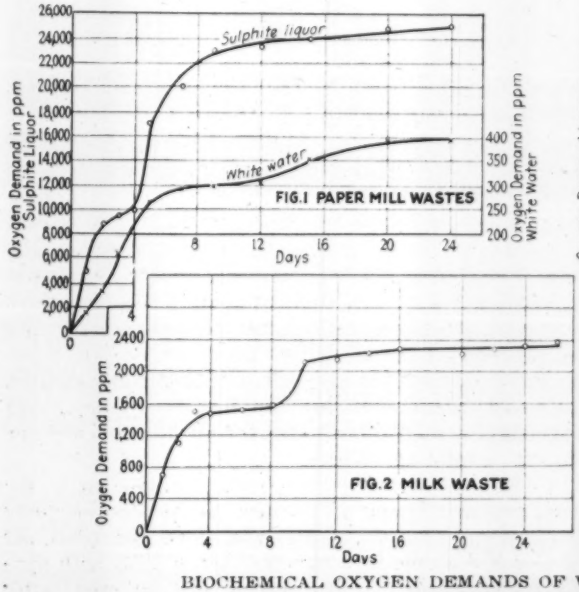
The wash water from the diffusion batteries contains some sugar, as well as other carbonaceous compounds, and undoubtedly nitrogenous matter. This curve is a very good indication of two-stage oxidation. The second stage occurs rather late, however, as it seems to take place between the sixteenth and twentieth days.

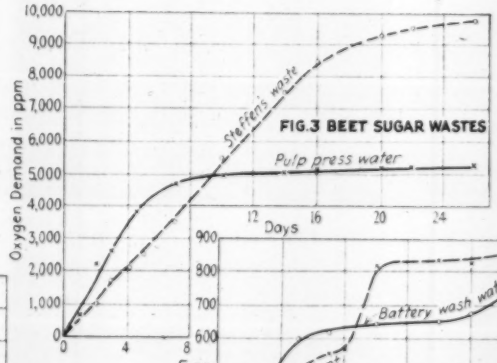
The lime pond effluent is very alkaline and contains some sugars as well as other compounds removed from the sugar water. The curve shows two-stage oxidation where the second stage takes place between the eighth and tenth days. The high alkalinity of the waste may account for the early nitrification.

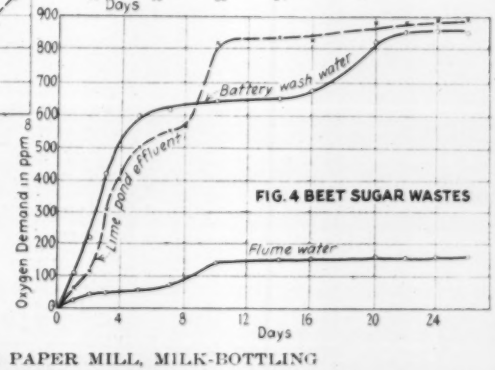
The pulp press water is that which is pressed from the sugar-beet pulp after it is removed from the diffusion batteries. This waste contains some sugars and should be somewhat similar to the battery wash water. The curve, however, does not show two-stage oxidation. This curve follows very closely the formula curve for the complete oxidation of substances.

After the sugar is removed from the lime-treated water, a molasses remains which still contains a large quantity of sugar. This is recovered by means of the Steffen process in a few of the sugar factories. Those plants not using this process store and sell the molasses. The waste which comes from the Steffen house is brown in color and contains a very high percentage of unstable organic material. This material consists of all of the compounds removed from the beets in the diffusion batteries except the sugar recovered in the process. The waste is highly putrescible. The curve for the rate of oxidation shows very little except that complete oxidation does not take place even in the 26 days' incubation.

Summary—(1) The rate of oxidation of each of these wastes under similar conditions is quite varied and for this reason any attempt to calculate the total oxygen demand from the five-day demand would lead to erroneous conclusions. (2) The construction of an oxidization curve which will apply generally to trade wastes is not possible, because of the variation in the type and proportionate quantities of oxidizeable materials dealt with. (3) The second stage of the two-stage oxidation does not take place at the same time with the different wastes studied. This may depend upon the pH of the incubated samples. Indications are that nitrification takes place more rapidly in the more alkaline samples. (4) First-stage oxidation, in most cases, closely follows the formula curve for the complete oxidation of substances.







BIOCHEMICAL OXYGEN DEMANDS OF WASTES FROM PAPER MILL, MILK-BOTTLING PLANT AND BEET-SUGAR FACTORY

All incubation at 20 deg. C. The different values necessitate the use of two different oxygen-demand scales.

New Rail-Renewal Practice on the Northern Pacific Railway

One Large Gang Equipped With Labor-Saving Appliances Replaces Several Small Gangs—Methods of Work

A NEW system and organization for rail-renewal work, introduced on the Northern Pacific Railway in 1929, promises to result in material economy and efficiency as compared with the previous practice. On the 1,900-mile main line of the Northern Pacific Railway between St. Paul, Minn., and Seattle, Wash., there are eleven operating divisions, and until 1929 the rail renewals had been handled by forces organized on each division. The track lengths of such renewals ranged from 5 to 25 miles and necessitated the organization of from four to eight separate gangs, so that to supply each gang with rail-laying cranes and power tools would have involved prohibitive cost.

As an improvement upon this method, it was decided in 1929 to organize one large steel gang or rail-renewal gang on the western end of the system for all work of this kind, and to supply it with a tie-scoring machine, rail crane, pneumatic spike pullers and spike drivers, pneumatic wrenches to run the nuts on the bolts and a gasoline-driven bolt tightener for the final tightening of the nuts. This gang started work as soon as weather conditions permitted in 1929 and during that year covered 88 miles of rail renewal with 100-lb. rails on the 1,900-mile stretch of main line.

The gang is under the direction of an assistant roadmaster who reports directly to the superintendent on whose division the gang is working. He is assisted by a general foreman and four assistant foremen, while the pneumatic tools, compressors and crane are serviced by an experienced machine man. The accounting is handled by an assistant auditor from the general office and two timekeepers, these latter also keeping account of the new material put in track and the old material released. Thus the supervising force consists of ten men.

In rail relaying the procedure is as follows: First, the tie scorer is run over the relay territory and all ties are scored to provide a uniform tie-plate support. The saws are set to just touch a new tie, and the older ties are thus automatically scored to the bottom of the embedded tie-plate. Then a small division organization distributes the rails and fastenings and relays the switches, as it is found uneconomical to do this work with the large gang. The steel gang, averaging about 150 men, next lays the new rail and completely finishes the job. It is followed by the small division force, which picks up the old material. Finally, the bolt tightener is run over the completed work and all nuts are given a final, and as nearly as possible, a uniform tightening.

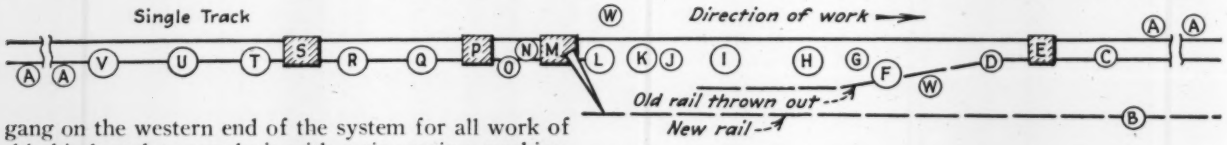
A full revolving type of crane is used, and is of sufficient capacity to load and unload compressors weighing about 6,500 lb. It is capable of running about 20 miles per hour, thus reducing to a minimum the time required to clear trains. Three compressors are assigned to the gang; one 160-cu.ft. machine operating four pneumatic spike pullers, a similar machine operating four spike drivers, and a small 110-cu.ft. unit operating two air wrenches. Each spike puller requires two men, and each driver and wrench requires one man. Relief crews are provided, as the labor is too arduous for one man to work continuously. The general practice is for one set of men to work for about ⅛ mile, and then turn over the tools for a similar period to their relief crews.

A normal arrangement of the force is shown on the accompanying diagram. One of the assistant foremen is in charge of the adzing gang; another the spiking gang; a third the gang placing rail anchors and doing the back work while the fourth is in charge of the air compressors and tools.

The gang works eight hours a day and loses an average of 25 per cent of that time in going to and from work and meeting trains. The average completed track relaid in 1929 was 1.06 track-miles a day, or 42 track-feet per man. This year the maximum day's relaying was slightly over two track-miles in eight hours, and for a limited period the record is a mile of rail on one side in 41 minutes. The average for this year is approximately 1½ track-miles daily, or 53 track-feet per man.

The steel gang is housed and transported in regular railroad boarding cars, the feeding and commissary arrangements being handled by a contractor. This train consists of about 48 cars, as shown below. It will be noted that a few more bunk cars are carried than are actually needed for 150 men, but occasionally the gang may number 160 to 170 for a few days and reserve equipment is necessary for these emergencies. The train, as set out at the work, is made up as follows: one flat car for rail cranes, one for compressors and three for motor, push and trailer cars, one gas-tank car, one tool car, one oil car, 23 bunk cars, one office and foreman's car, one car for assistant roadmaster and auditor, two water cars, one kitchen car, five dining cars, three commissary cars, two bunk cars for kitchen help and one coal car, a total of 48 cars.

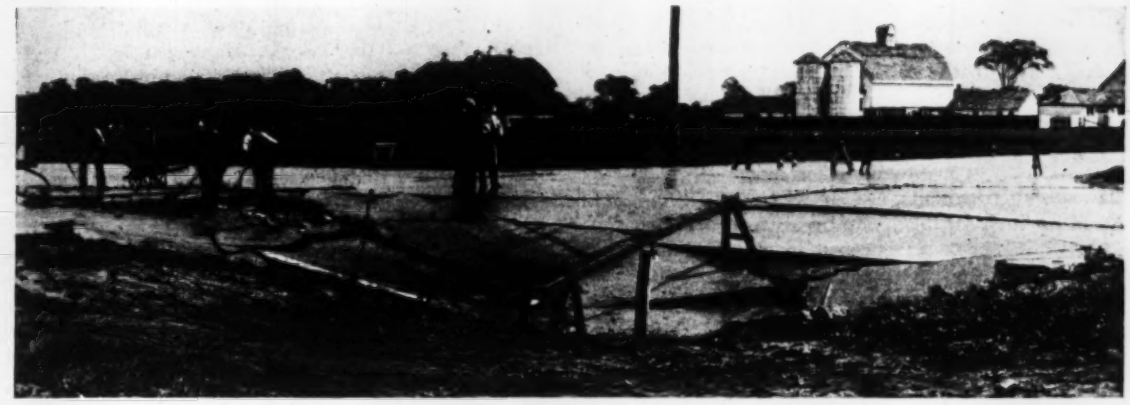
In 1929, the work assigned to the gang—that is, the actual complete laying of the new rail but not including distribution and picking up—was done for $446 per mile, or $98 a mile less than the cost in 1928 with division organizations. It is expected that an even better figure will be shown for 1930.



LABOR DISTRIBUTION FOR RAIL RENEWAL
(Letters refer to locations shown on the diagram)

A.	Flagmen	4	
B.	Placing splice bars on new rail (outside track)	2	
C.	Pulling joint spikes on old rail	3	
D.	Disconnecting old rails	2	
E.	Pulling spikes with air-pullers	14	
F.	Lining out old rail with bars	6	
G.	Removing old tie-plates	3	
H.	Setting tie plugs	9	
I.	Adzing tie-plate seats	18	
J.	Cleaning tie-plate seats	1	
K.	Creosoting tie-plate seats	4	
L.	Placing new tie-plates	4	
M.	With rail-handling crane	5	
N.	Dipping bolts in oil	1	
O.	Placing bolts in splices	3	
P.	Running up nuts with air-wrenches	3	
Q.	Spiking to gage (by hand)	15	
R.	Setting spikes for air hammers	12	
S.	Driving spikes, with air hammers	8	
T.	Tightening bolts with power wrenches	8	
U.	Back work*	12	
V.	Placing rail anchors†	4 to 16	
W.	Water boys	2	
	Total	144 to 156	

*Straightening tie-plates, etc.
†Number depends upon number and type of rail anchors.



PAVEMENT SETTLEMENT AT FORD ROAD FAILURE
During construction of tunnnel, air escaping from heading caused eruption of water and sand from well in dairy farm in background, material being thrown as nigh as top of tree in right background.

Southfield Road Tunnel-Sewer Failures, Detroit, Mich.

Survey of Construction Conditions, Occurrence and Character of Failures, Action of the Special Investigating Committee and Probable Manner of Reconstruction

THREE serious failures of the lower portion of the Southfield Road sewer in Detroit have been the occasion for the dismissal of the city engineer, his subsequent reinstatement, the appointment of a committee of engineers to investigate the failures, and efforts to place the responsibility. The first break in the sewer, built by tunneling through clay and quicksand, was reported in the early summer of 1929, but conditions have become acute only since February of this year.

Great difficulties were encountered by the contractors in tunneling through the quicksand, and the quality of the work done, as shown by the inspection at this time, was quite unsatisfactory. The concrete is light, porous and deficient in cement, and the lining is 12 to 15 in. thick instead of 16 in. required by the specifications. In the opinion of the investigating committee, failure was caused by infiltration of groundwater through cracks and construction joints in concrete of poor quality, carrying with it into the interior of the sewer great quantities of the surrounding extremely fine sand, resulting in an impairment of the foundation and subsequent settlement. These conclusions are only tentative, as the final report is not to be presented until July 10.

Location and Construction

The combined sewer in Southfield Road drains an area of about 20 square miles on the west side of Detroit. From its outlet at River Rouge, within the limits of the city of Dearborn, to its upper end, half a mile from the northern city boundary, its total length is about 9½ miles. For the greater part of its length it is 10 ft. in diameter. The lower 1¾ miles is to take its place in the future as part of the system of interceptors which will be necessary when the proposed sewage-treatment plant is constructed, and so has been placed at a lower elevation than the remainder of the line. The depth to the invert of this lower portion is approximately 40 ft. and is at such an elevation that it is submerged by the water from River Rouge. The upper end of this interceptor section is at Ford Road, where the invert rises 9 ft. in a length of 60 ft. to connect with the remainder of the line at the higher level. The entire length of 9½ miles was built in tunnel, with specifications calling for plain concrete lining 16 in. thick in the 10-ft. sections.

A study of the subsurface material through which the sewer was to be built was made with the assistance of auger borings and disclosed the yellow and blue clay characteristic of the Detroit region for a depth of about 90 ft. for most of the line. From Warren Ave. south to River Rouge, however, the clay lies over a fine wet sand, with the contact between clay and sand very irregular but coming to within 25 ft. of the surface for about 3,000 ft. It was apparent that the line would pass through this water-bearing sand.

The part of the sewer south of Warren Ave. was divided into two contracts. Section 1, from River Rouge to Ford Road, including the sloping section at that point, was let to Julius Porath & Son; and section 2, from Ford Road to Warren Ave., to Lennane & McIlvenna. Both contracts were let in 1926 and work proceeded concurrently until completion, in August, 1928, on section 1, and January, 1928, on section 2. Both contractors experienced difficulty in driving the tunnels through the wet sand. The sand was extremely fine, as much as 97 per cent passing a 200-mesh sieve, and the water table was at the line of contact with the clay overburden, placing the entire tunnel bore under a head of water.

No shields were used in driving the tunnels. Where the wet sand was encountered compressed air was applied to the headings, but because of the nature of the material pressure was difficult to maintain. When it became impossible for the compressed air to drive out the water from the bottom of the excavation without being lost at the top, mining was discontinued and grouting of the surrounding material was resorted to. There were occasions, however, when the compressed air in escaping from the tunnel made its way laterally through the sand layer and appeared at the surface of the ground some distance away, at points where the clay overburden was punctured by wells. There is a record of an eruption

through a well on neighboring property, 1,300 ft. from the face of the heading, of sufficient intensity to throw sand and water to the top of a 50-ft. high willow tree near by.

Records and reports are not entirely clear as to the method of placing the invert concrete under these trying conditions. The superintendent for one of the contractors has stated informally that it was found impossible to hold more than 10 lb. of air pressure in the heading, even when air was being pumped in at a rate of 2,500 cu.ft. per minute, and that it became necessary to resort to pumping to remove the last 18 in. of water in the bottom. The chief inspector, on the other hand, has testified that the pressure in the tunnel was maintained as high as 20 lb. at times, and that at no time was concrete placed in water.

Development of First Failures

Some months after the completion and final inspection of sections 1 and 2, in January, 1929, construction was started by the maintenance division on a small pumping station at Kirkwood Ave., about ¼ mile north of Ford Road. The purpose of this station was to divert the dry-weather flow of the sewer into a short open ditch which flowed into one of the intercepting sewers of the Dearborn system and thence to the Dearborn sewage-treatment plant. This arrangement was agreed to in order to prevent the creation of a nuisance at the outlet of the Southfield sewer, pending the construction of a treatment plant by Detroit.

Just prior to the completion of this station in June, 1929, those engaged in its construction observed cracks in the crown and haunches of the Southfield sewer at a point near where they were making their connection. Slight settlement of the roadway above was also noted. The head of the maintenance division reported this cracking to the city engineer's department and after a conference with the commissioner of public works was ordered to undertake its repair.

Repairs were not begun, however, until Nov. 7, 1929, five months after the report of the cracking. At that time the sewer was found to have failed badly. The water with which it was filled was pumped out, and the sewer barrel was uncovered by excavating from the surface. As the repair work progressed north from the excavation, the settlement and structural failure of the sewer were found to grow worse, straight vertical shearing at construction joints being evident, until a total vertical displacement of half the tunnel diameter was reached a short distance north of the excavation.

INTERIOR OF SEWER AT FIRST BREAK

Northern extent of repairs by maintenance department. Note the vertical displacement of the failed section, which here attained 5 ft. in amount. Crack in right end of arch. No keyed construction joint in evidence.

During these attempts at repair it was noted that water was backing up on the work from the south. This observation occasioned an inspection of the lower end of the line, and a further failure was found 3,000 ft. south of the first one, evidenced by a settlement of the roadway at that point. This second failure was noted and reported to the city engineer and the commissioner of public works on Feb. 21, 1930. As this section of the line was normally submerged, it was impossible to make a more detailed inspection without the aid of a diver or unless the line were dewatered. Accordingly a diver was assigned to the inspection of the interior and a report of his observations was made to the commissioner of public works.

Hearings and Investigations

Shortly thereafter the newly elected mayor replaced the commissioner of public works, John W. Reid, by a new appointee, John Gillespie. A short time after taking over his duties the new commissioner had his attention called to the second sewer failure and made a personal inspection of the site.

The publicity attendant upon this second failure resulted in proposals by the common council to engage the services of outside engineers to investigate the causes of failure and to recommend methods of reconstruction. This plan met with opposition from the new commissioner, who advocated an investigation by his own department instead. The city engineer, however, preferred the study to be made by outside engineers, as proposed by the council, and made his wishes known in a statement requested by the newspapers. On the day following the appearance of this statement the city engineer, Perry A. Fellows, was discharged by the commissioner. As the city engineer's position comes under the civil service commission's jurisdiction, the commissioner of public works was informed by counsel that in order to effect the discharge of the city engineer he would have to prefer specific charges and have him stand trial before the civil service commission.

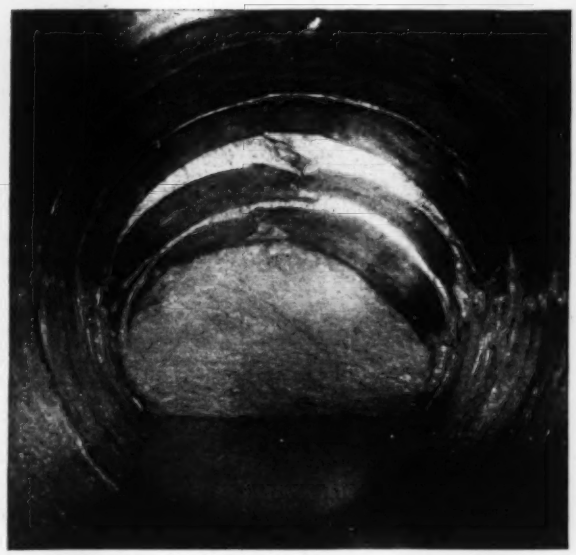
The charges were preferred and Mr. Fellows was tried by the commission for insubordination, inefficiency and neglect of duty. As reported in *Engineering News-Record* of May 29, 1930, p. 912, the civil service commission reinstated him as city engineer.

In the meantime, however, the commissioner of public works had become convinced of the desirability of the appointment of a committee of outside engineers to study the sewer failures, and accordingly a committee was selected consisting of C. G. Wrentmore, of Detroit, chairman, George H. Rubling, of Detroit, and A. H. Smith, of Toledo.

Nature of Failures and Plans for Reconstruction

During the progress of the trial of the city engineer a third failure occurred at the intersection of Southfield Road and Ford Road, where the two contract sections joined, at the sloping section of the sewer. This third failure caused a large depression in the roadway at this point, the total volume of which is more than 1,000 cu.yd. at present.

The committee of engineers appreciated the fact that



INTERIOR OF SEWER, BARREL FORD ROAD

As seen from just north of the break. Note the irregular alignment as shown by water surface. Vertical shearing displacement can be seen at three sections. Sewer filled with sand from openings in roof. Note also the plastering of the invert up to the springline. Cracks in crown also apparent.

attempts to unwater the sewer would result in a hydrostatic head on the barrel due to the surrounding groundwater, and by infiltration through the cracks in the concrete would carry into the line great quantities of the fine sand, further undermining the sewer and causing greater danger of collapse. To make such dewatering safe, therefore, they ordered 10-in. wells driven to hardpan in the vicinity of the breaks to lower the water table. At the location of the second break one such well, 90 ft. deep, equipped with strainers 30 ft. long, was driven on each side of the sewer barrel. The operation of turbine pumps to deliver 500 gal. per minute resulted in drawing down the water table directly over the failed section to the level of the invert. At the point of the third break it was necessary to drive four wells and increase the discharge to 2,500 gal. per minute in order to obtain the same amount of drawdown. With the water table lowered in this fashion, it became possible to pump the water out of the barrel and make a detailed inspection of the interior.

In addition to the work in lowering the water level in the material surrounding the failed sections, borings were taken at approximately 200-ft. intervals along the line of the sewer, and samples of the material were taken at intervals of 5 ft. in depth. These borings showed the irregular surface of contact between the sand and the overlying clay, and also that the sand extended to hardpan at a depth of about 90 ft. The sand was found to be extremely fine, although it becomes slightly coarser at greater depths. The sand-clay contact surface dips to the south in the vicinity of River Rouge, so that the portion of the sewer within 1,500 ft. of the river is entirely in clay.

The interior of the sewer at present shows alignment and grade of very irregular character. There are points where the direction of the barrel deviates from a straight line by as much as 5 ft., where construction difficulties apparently necessitated such changes from the plans. Exclusive of these large deviations, there is continuous evidence of only approximate alignment of the inside forms. The irregularity of the grade of the invert is made apparent by the greatly varying depth of water still in the barrel. Although there is at present no direct flow through the line, the depth of water experienced in walking north through the section below the second break varies from about 6 in. to more than 2 ft. In this section, in which no failure has occurred, there are a number of circumferential cracks, apparently at construction joints, and some diagonal cracks from crown to invert, making about a 45 deg. angle with the axis of the sewer. All these cracks show evidence of leakage, with laitance scum an inch thick in places. The seepage becomes a pronounced jet when the accumulated scum and laitance are removed from the surface.

At both the first and third breaks, the only ones accessible at present, the final failure has occurred by a vertical movement of the sewer barrel, resulting in vertical shearing action between adjoining sections. These displacements have allowed sand to pour in from the roof to the tunnel. At the first break this vertical displacement has attained a magnitude of 5 ft. at the point where further inspection becomes impossible. Displacement at the third break, under Ford Road, has reached about 18 in., where further progress is blocked by a wall of sand.

The lower half of the sewer has been plastered over with a cement coating, which is now easily peeled off. Corings of the concrete lining show a light, porous material, apparently deficient in cement at present, and a thickness of lining of as low as 12 in. in places. There was noticed one core hole in the roof in which there was a clear space of a few inches between the top of the concrete and the under side of the wood lagging still in place supporting the roof. In addition to small-diameter cores taken to determine the thickness of the lining, cores 6 in. in diameter are being taken from crown, invert and spring line to be subjected to crushing tests.

The plans of the committee of engineers to reconstruct the failed portions are still tentative, but will probably consist of excavating from the surface to uncover all the broken portions, driving steel sheetpiling on both sides of the sewer down to hardpan, removing all the old section of sewer, and replacing it with a concrete line placed in the open trenches.

Organization of Detroit Public Works Department

The department of public works in Detroit is composed of a number of subdepartments, one of which is the department of the city engineer. This department is charged with the responsibility for the design and construction of public improvements under the jurisdiction of the public works department, consisting largely of pavements and sewers. Completed structures are turned over to the department of maintenance, an independent bureau reporting directly to the commissioner of public works and outside the jurisdiction of the city engineer.

The city engineer's department in turn is divided into a design bureau and an inspection bureau. The latter organization has charge of all the construction work involved in the sewer and paving programs of the city, under the supervision of the city engineer. All positions from that of the city engineer down to the individual draftsmen and inspectors are protected by civil service. Although the positions in the design bureaus are filled on a basis of the engineering qualifications of the applicants, such is not the case in the inspection bureau. Attempts to set up engineering qualifications for the members of the bureau have not been successful, and the inspection service is not officially considered an engineering function in Detroit.

Thin Rock-Asphalt Surfacing Laid on Old Penetration Macadam

Pitted Surface Leveled Up and Trued to New Crown With Black Base—Rock-Asphalt Surfacing Only ¾ In. Thick

By Grant Faith
Resident Engineer, Tennessee Highway Department, Murfreesboro, Tenn.

A NOTABLY thin surfacing of cold-laid rock asphalt was employed successfully in 1929 in rebuilding the main road from the Davidson County line to Murfreesboro, Tenn. The old road, constructed in 1921, had a bituminous macadam top laid over a modified telford base. The traffic is very heavy, and eight years of it had worn the surface rough and it had become difficult and costly to maintain. Resurfacing was decided upon.

SURFACING ROAD HALF AT A TIME WITH COLD-LAID ROCK ASPHALT

Black base or binder in sufficient quantity to reduce the amount of crown and level up the road in worn places and depressions was laid directly over the worn penetration top and was rolled in. An average of 671 tons per mile was used. The rock asphalt was then spread directly over the black base and raked out to a thickness of 1⅛ in. loose, to provide a ¾-in. wearing surface after rolling.

It was impossible to detour the traffic at any point, and consequently one-half the road was reconstructed at a time, allowing traffic the free use of half the road at all times. Owing to the density of traffic in both directions, the roller followed the spreaders very closely, both on the black base and on the rock asphalt top; traffic was allowed to use the newly rolled section immediately behind the roller.

In laying a road of this kind, where the new surface is to be used immediately by fast, heavy traffic, the roller should be very heavy; a 12- or 14-ton roller would be much better than the 10-ton roller used on this project. The heavier roller so compacts the new surface that traffic affects it much less than if a light roller is used. However, traffic marks from heavy vehicles on the newly rolled surface soon iron out and disappear.

When laying the wearing surface, strips of lumber 1½ in. thick by 3 in. wide were laid down the center line of the road. These served as a depth gage for the rakers and formed a clean, straight edge to work to when laying the surface on the opposite side of the road. The surfacing was given two rollings with a 10-ton roller, after which a light coating of sifted rock asphalt was spread over the surface. This was raked in with the back of the rake completely to fill and seal any honeycombed spots that were caused by unevenness in the first spreading. It was again rolled and a splendid surface was secured.

As this wearing surface was laid only ¾ in. thick (compacted), just half the standard thickness, great care was used in the second spreading and subsequently to fill all small depressions and holes left by irregular raking in the first spreading. This is one of the most important details in laying this material, as small pot holes will develop in the road under wear, where there is not enough depth of material completely to fill each and every square inch of the surface. With a uniform depth of material under the roller, it bonds into a waterproof sheet that protects the base from surface moisture and withstands the severest traffic.

The contract for this work was let to the John L. Humbard Construction Co., of Knoxville, Tenn., in June, 1929, and the work was completed Sept. 14, just three months after it was begun. The total length was 16.33 miles and the width of pavement was 20 ft.

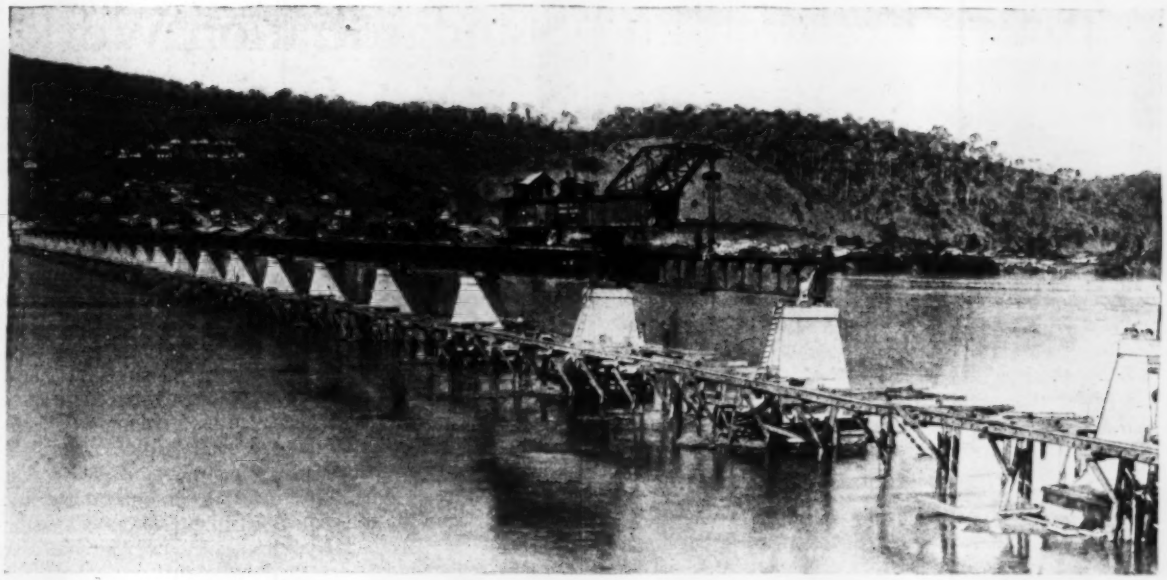
Derrick Built of Bridge Members Erects Brazilian Bridge

By Manfredo de Araujo Carvalho
Civil Engineer, Rio de Janeiro, Brazil

IN ERECTING the Rio Doce bridge, a combined railway and highway traffic crossing connecting the northern and southern parts of the State of Espirito Santo, Brazil, a Brazilian engineering firm made ingenious utilization of the bridge members to construct erection equipment. The improvised traveler derrick is shown in the accompanying illustrations.

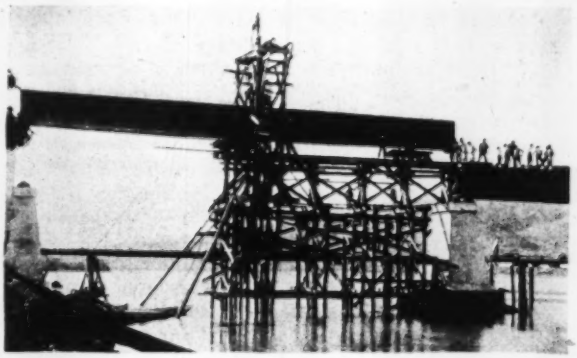
The river at the location of the bridge is 2,500 ft. wide

FRONT END OF IMPROVISED ERECTION TRAVELER



ERECTING NEXT TO LAST SPAN, RIO DOCE BRIDGE, BRAZIL
For last span, traveler was dismantled and its steelwork used in the bridge.

and 20 ft. deep, running over a bed of sand, so that all piers were built on concrete piles. The superstructure consists of 26 girder spans of 85 ft. each. The weight of each span is 46 tons and the largest sections to be handled weighed 6 tons and were about 30 ft. long. The use of falsework for erection would have required a trestle 50 ft. high and about 2,300 ft. long, which would have been unusually costly. Also, in view of a necessity



ERECTING LAST GIRDER SPAN BY MEANS OF FALSEWORK AND HEADFRAME, RIO DOCE BRIDGE, BRAZIL

for completing the bridge at the earliest possible moment, it was decided to erect the girders by means of a cantilever derrick car constructed as follows:

By means of a 10-ton locomotive crane, the girders making up the last span in the bridge were set on two railroad trucks, one of which was placed at the rear and the other at the mid-point of the girders. These girders were then spaced and braced by means of the cross-frames used in the bridge. On the front end of the girders a cantilever truss 20 ft. long was erected so that the distance from the front truck to the end of the cantilever truss was about 48 ft., a distance long enough to reach the middle of the next span with the front truck located over the pier. On the end of the cantilever truss a cross-girder was placed together with a chain block. At the rear end of the girder a counterweight was erected consisting of a box filled with sand and cast iron. The traveler was moved by means of lines attached to a steam hoist on shore.

With the use of this special erection traveler 1,000 tons of steel making up 22 spans were placed in 32 working days. Following the erection of the 25th span, the girders in the erection traveler were dismantled and placed across the opening for the 26th span using the falsework and overhead frame shown in one of the photographs reproduced herewith.

The bridge was designed and erected by Soares de Sampaio & Cia., Ltd., Rio de Janeiro. Oscar Machado da Costa, chief engineer, was personally in charge of both design and construction.

Liability for Impure Water

Attorney General Ward of the State of New York has rendered an opinion regarding the liability of private water companies and municipalities when the water has been found unsafe for human consumption. The opinion, in part, follows:

It is my opinion that a water company or a municipality furnishing water is not a guarantor of the purity of its product in the absence of a contract obligation to that effect, and is not responsible to a party poisoned by impurities in the water unless shown to have known of the condition of the water or to have been negligent in failing to discover or disclose the danger, nor in any case where the party injured was himself at fault; still, such water company or municipality must furnish pure and wholesome water fit for human consumption, which means water which is pure and wholesome and fit for domestic use, but not necessarily that it should be chemically pure. If the water does not conform to this standard, such water company or municipality may be liable for damages to persons injured by reason of the impurities.

I believe that the posting of notices to the effect that the water is unfit for drinking purposes does not absolve a municipality or water company from using diligent effort to render said water pure and wholesome and that if a water company or a municipality should fail so to do, the water company or municipality is liable in damages to a person injured by reason thereof, and that the mere posting of such notices will not relieve such company or municipality from its liability.

Active Research and Standardization Work Discussed at A.S.T.M. Meeting

Metals Maintain Leading Place—New Results on Fatigue and Corrosion—Higher Cement Strength Specified—Standardization Extensive but Largely Routine

A PROGRAM of remarkable strength characterized the 33d meeting of the American Society for Testing Materials at Atlantic City last week (June 24-27). In harmony with the growth of the organization during the year—its membership now approaches 4,500—the attendance was greater than at prior meetings. Active, businesslike sessions were held, though the program was badly crowded. There were no less than fourteen technical sessions during the four days, twelve of these occupying six periods as two simultaneous sessions—a diet rather too ample for a normal digestion. In its net effect the meeting placed the subject of technical materials more definitely than heretofore in a front-rank position in engineering as well as in many related industries.

The standardizing work reported by the various committees, though largely routine in character, was of very large volume, and this department of the society's work is apparently expanding rapidly and continuously. Nearly 600 standards are now in force, and their revision as well as work on new materials and varieties engages even more and larger committees. The 87 existing committees have an aggregate membership of 2,400. Two new committees, on die-cast metals and on masonry, have recently been set up.

Some Committees Reorganizing

Partly because of volume of work and the unwieldy size of many committees, partly because of obsolescence, a number of committees have begun to reorganize, among them the cement committee. A significant step taken by the petroleum products committee is to organize technical committees separate from its existing subcommittees and designed to include men outside the society, with a view to meeting the requirements for sectional committees of the American Standards Association. Further with a view to taking care of the growing complexity of committee activities the society has set up a control committee of standardization work, which began functioning during the past year.

The strength of last week's meeting lay mainly in the research results reported in papers. Research is increasing even within the standardizing committees, as partly shown by the fact that eighteen special monographs on research results were appended to committee reports. There were 73 independent papers; the total, 91, reflects the large place which investigation work occupies in the society's field.

One unusually interesting feature was a paper by L. S. Moisseiff, consulting engineer, giving results of tests of the cold-drawn wire made for the Ambassador and Mount Hope bridges after the mysterious failure a year ago.

In order that we may present an adequate coverage of the papers and reports it is necessary to divide our account of the meeting into two sections. This first section presents the points of general interest, outlines those specification changes which are pertinent to the field and presents the papers and research reports which were devoted to metal problems, such as testing instruments and methods, corrosion and fatigue. Next week the concluding section will treat of cement and concrete and such other materials as brick, slate, gypsum, timber and paint.

Special Features of the Meeting

Dr. C. E. K. Mees, director of research and development of the Eastman Kodak Co., contributed an event of special appeal to the meeting in his delivery of the Edgar Marburg lecture. Under the head "Color and Its Measurement" he outlined the phenomena of color analysis and synthesis, with experimental demonstration, and indicated some of the principles of measurement and comparison of colors. He pointed out, however, that in many cases the eye remains the most sensitive color discriminant, being able to distinguish more readily than any instrument between important variations of white-paper shades, for example.

The Dudley medal for the best paper of the past year was conferred upon J. R. Townsend (Bell Telephone Laboratories), W. A. Straw (Western Electric Co.) and C. H. Davis (American Brass Co.), for a paper on "Physical Properties and Methods of Test for Some Sheet Non-Ferrous Metals."

Retiring President Thomas D. Lynch (Westinghouse Electric & Mfg. Co.) addressed the society on the meaning of both specifications and investigative work to the progress of the productive arts. Among other things he said:

> As engineering advances, the tendency is to stress materials higher and higher to meet new developments and economic conditions, until the factors of safety become so narrow that the designers must know by experiment what stresses will endure the loads . . . The development of new materials or a different treatment of old materials may be the answer.

In the executive committee's review of the year's work some important items were that the society held its first regional meeting last March; that co-operation with the American Standards Association in national standardization is growing rapidly, and that co-operation with the German society for testing materials or testing of lubricants has been begun.

Large growth of the work of committee E-1, on methods of testing, is an outstanding feature of the society's committee work. One recent development in this committee is the organization of a subcommittee to investigate the significance of various measures of the elastic strength of metals.

Specification Work

Malleable Castings—Yield-point requirements were raised from 30,000 to 32,500 lb. per square inch.

Cast Iron—In high-test gray iron castings the transverse test load was changed from 2,250 to 2,500 lb., and the tensile breaking strength from 28,000 to 33,000 lb. per square inch. Specifications for castings for valves and fittings were advanced to standard over strong protest from Southern producers, who claimed that the 0.75 per cent phosphorus limit discriminates against their iron.

Structural Steel—Increasing the tensile strength re-

quirement for structural steel by 5,000 to 7,000 lb. per square inch was considered, but present demand does not warrant abandoning the existing 55,000-65,000 grade. Adding the higher-strength steel as medium grade, while retaining the present soft grade, is under study. Revision of rivet requirements is also being considered. Revision of the ship steel specification is similarly in progress.

Reinforcement Bars—Revisions of the billet-steel reinforcement specification, made tentatively two years ago, were advanced to standard.

Pipe—Work is under way on quality specifications for welded, riveted and lock-bar pipe. Simultaneously a sectional committee of the American Standards Association is at work on dimensional standards for pipe, which may be completed next year. In the field of clay and cement-concrete pipe, committee D-4 presented two specification developments. A new tentative specification for reinforced-concrete pipe was adopted, in large part based on a field survey of 191 existing reinforced-concrete sewers, 24 to 108 in. in diameter. The other development was the adoption as a tentative standard of the joint concrete culvert pipe committee's specification.

Open-Hearth Iron Flange Plates—For the first time specifications for open-hearth iron flange plates were drafted and adopted, to meet a demand for such material for pressure vessels. The mechanical requirements are 44,000 lb. strength, 27,500 lb. yield point, 25 per cent elongation, and both tranverse and longitudinal bend tests. Three compositions are recognized, one without copper and molybdenum and with a limiting total of 0.10 per cent metalloids, a second with 0.20 copper and 0.25 metalloids, and a third with 0.40 copper, 0.05 molybdenum and 0.25 metalloids.

K. G. MACKENZIE
Newly elected president of the A.S.T.M. He is consulting chemist, Texas Co., New York City.

Steel for Fusion Welding—A study of the suitability of standard steel for fusion welding by a subcommittee of the steel committee resulted in the finding that satisfactory fusion welding by the regular commercial processes is feasible with steel of the following A.S.T.M. grades: bridge, building, locomotive and car, ship, boiler and firebox, forgewelding plate, boiler tube, welded and seamless pipe, cold-drawn wire reinforcement.

Zinc-Coated Structural Steel—Specifications for zinc-coated structural steel such as is used in transmission towers, tentatively accepted two years ago after being drafted by an A.S.A. sectional committee, were revised during the year after shop tests and practical trial. As revised, they allow the use of any type of recognized steel, reduce the weight of coating to 2 oz. average with 1.8 oz. permissible in single samples, and limit the impurities in the spelter bath. Rejection because of steel embrittlement is to be covered by separate contract provisions.

Paving and Waterproofing—General revision work only was done on paving materials and on waterproofing and roofing. The latter committee has defined "dampproofing" as referring to means for keeping out water not under pressure, while "waterproofing" refers to pressure conditions.

Cement—One of the most important specification developments was the adopting for submission to letter ballot of the membership of a revision of the standard portland cement specification, last revised four years ago, involving raising the average minimum tensile strength requirements from 225 lb. to 275 lb. per square inch at 7 days and from 325 lb. to 350 lb. per square inch at 28 days. The revision also contemplates the separation of the present specification into two specifications, one dealing with quality requirements and the other with test methods. The tentative specification for high-early-strength portland which went into effect during the year was continued as tentative without revision.

Flexure Test of Concrete—A new tentative standard specification was adopted relating to a "laboratory method of making flexure tests of concrete, using a simple beam with center loading." In highway work, where knowledge of flexure is of special importance, many states have developed methods and equipment for making flexure tests in the field. This new specification is the first attempt made to correlate the various current methods of test. The beam specimens are 6x6 in. in cross-section for 1½-in. coarse aggregate and 8x8 in. for 2- and 2½-in. coarse aggregate. Rigid, watertight and non-absorptive forms are required.

Sand-Lime Brick—A complete revision of the sand-lime building-brick specification, bringing the physical requirements in line with those for clay and shale brick, was adopted as standard.

Hollow Masonry Units—All strength requirements and tests were eliminated from the specification for partition and fireproofing tile. The specification for load-bearing tile was revised, permitting the use of heavier tile by providing for a tolerance of 12.5 per cent over in weight as compared with the previous 5 per cent. This change will make possible the use of the society's standard in those localities which specify a minimum shell thickness for the tile.

Timber—A new tentative specification for timber piles was adopted superseding the "standard specifications for Southern pine piles and poles to be creosoted." Another new tentative specification in the timber field is that of definitions of terms relating to timber preservatives.

Testing Instruments and Methods

Progress in impact testing during recent years was summarized by J. M. Lessells (Westinghouse Electric & Mfg. Co.) for the committee on methods of testing. The summary points out that in an increasing range of materials an impact test correlates better with service experience than any static test (insulators, wood, cast-iron and some steels). In metals, impact tests are used more widely in Europe.

Several new instruments and test methods were described. R. L. Templin and R. L. Moore (Aluminum Research Laboratories) investigated tubular torsion specimens and showed that the ratio of outer diameter to wall thickness should be about 10 to give correct results and avoid collapse.

Values of hardness equal to those of the Brinell ball test can be obtained, according to Prof. I. H. Cowdrey (Massachusetts Institute of Technology), by pressing together two parallel cylinders of the metal to be tested (5 to 15 mm. diameter, 10 to 15 mm. long, 500 to 3,000 kg. pressure). The Brinell number equals 1.52 times the cylinder number (kg. pressure divided by sq.mm. area of flattening).

A magnetic strain gage suitable for high-speed dynamic tests, described by J. P. Shamberger (Westinghouse Electric & Mfg. Co.), has an armature mounted with a slight clearance between two pole-pieces energized by alternating current, and moved toward one or the other by the strain to be measured. The movement changes the voltages in the coils, and this change, measured by a bridge circuit, is a reading of the strain. The gage is to be used in the work of the track stress committee.

Successful application of magnetic testing was described by W. B. Kouwenhoven and A. C. Seletzky (Johns Hopkins University), who placed two test coils, one for the standard and one for the test specimen, in a bridge circuit with a phase-shifting device. The readings could be rendered reasonably independent of the size of the specimen. Tests on knife blades demonstrated the ability of the instrument to detect the condition of the steel.

Corrosion Results and New Studies

Corrosion testing, both by exposure and by accelerated laboratory test, showed further increase of activity and is now one of the most extensive fields of work within the society. Tests are in progress or in contemplation on ordinary steel and iron, stainless steel, non-ferrous alloys, screen cloth and galvanized steel.

Black Sheets in Thirteen-Year Exposure—Exposures of 486 black steel and iron sheets of 16 and 22 gage, begun in October, 1916, at Annapolis, in part to compare copper-bearing and copper-free metal, showed the following results in April, 1930: No 16-gage sheets failed; no 22-gage copper-bearing sheets failed; 32 (out of 79) copper-free 22-gage sheets failed. The failures included open-hearth and bessemer steel and open-hearth pure iron.

Immersion Tests—Immersion tests, on the other hand, showed no material difference in corrosion resistance between copper-bearing and copper-free metal. This as well as the preceding finding agrees with the results of earlier tests of the same committee (A-5, corrosion of iron and steel). Immersion in the Severn River at Annapolis (brackish water) has continued for ten years since June, 1920, and by March, 1930, the test was concluded, as only one sheet survived (one of six sheets of copper-bearing puddled iron). Three-year exposure in seawater at Key West showed 91 failures out of 150 sheets of 22 gage, and six failures out of 138 sheets of 16 gage. Similar seawater exposure at Portsmouth, N. H., showed in the same three years 105 failures out of 150 sheets of 22 gage, and two failures out of 138 sheets of 16 gage.

Seawater immersion tests of riveted plates and copper-steel pipe are in progress at Key West, Portsmouth and Port Arthur, but no results has yet been obtained.

Immersion tests in 20 per cent sulphuric acid are to be begun.

Galvanized Sheets and Hardware—Galvanized sheets and hardware (including also aluminum-coated, pulverized lead-coated and cadmium-plated articles) were exposed in April, 1926, at Pittsburgh, Altoona, State College (Pa.), Sandy Hook and Key West. Most of the sheets at Altoona and Pittsburgh failed in 3½ years, indicating the severity of attack of industrial atmospheres; no failures occurred at the three other stations. Failure of the hardware coatings are beginning, after sixteen months' exposure, except that no failures of hot-dipped galvanizing or of hot-dipped aluminum coatings have yet occurred.

Chromium coatings are to be tested on the racks of four of the stations.

Culvert Tests—Exposure tests of corrugated culverts (No. 14 gage, 2-oz. zinc coating, 24 to 36 in. diameter) are to be begun this summer. Various grades of steel and iron will be used as base metal. Locations giving intermittent flow are contemplated.

Non-Ferrous Corrosion—Large-scale atmospheric corrosion tests at nine locations and a series of immersion tests are being started by committee B-3, covering some 23,000 specimens of copper-zinc, tin, aluminum and a large number of alloys. Galvanic and electrolytic corrosion tests will also be started soon.

Stainless Steel—Committee A-10, on iron-chromium-nickel alloys, is about to begin laboratory corrosion tests on four stainless alloys in three forms of test, and immersion, salt spray, and copper-sulphate stain, fourteen laboratories participating.

Screen Wire Cloth—Exposure tests of non-ferrous screen cloth have been in position for four years at Pittsburgh, Portsmouth (Va.), Canal Zone, and Washington. Parallel thereto, tensile tests have been made on salt-spray samples and on atmospheric-exposure samples.

Salt spray exposure of narrow strips produced 75 per cent loss of tensile strength in 1,000 to 5,000 hours in most of the materials. Atmospheric exposure at Washington for 3½ years produced only slight loss of strength (5 per cent or less) and showed no difference in loss between the several materials.

The atmospheric exposures of larger screen samples began in May to November, 1925. At Washington no failures have occurred and no differences developed; at Pittsburgh, where much more severe corrosion was general, one screen failed (Monel metal); at Canal Zone, no failures; Portsmouth, one failure (80 copper, 20 zinc, badly corroded and highly brittle).

The sulphur dioxide in the air has been measured to show amount and seasonal variations. At Washington more than one part per million was found in February, March, July, October and December. Averages measured at Pittsburgh showed highest values (0.35-0.67 p.p.m.) in September and October, and special tests during a fog showed sharp drop in SO_2 (from 1.1 to 0.2 p.p.m.) as the fog cleared away. Canal Zone tests showed daily averages reaching 0.60 to 1.0 p.p.m. in May and June. Portsmouth averages ranged around 1.0 p.p.m.

C. L. Hippensteel, C. W. Borgmann and F. F. Farnsworth reported elaborate outdoor corrosion tests of galvanized articles, with intermittent water spray. Corrosion rate generally decreased markedly when the zinc layer had disappeared and the zinc alloy was exposed.

A thorough study of the interpretation of test data considered as statistics was presented by C. H. Humes, R. F. Passano and Anson Hayes (American Rolling Mill Co.) under the title "A Study of the Error of Averages and Its Application to Corrosion Tests." The authors determine the number of observations which a series should comprise to give a specified precision of result. Applying their method to the atmospheric corrosion tests completed by committee A-5, they find that the 22-gage sheets yielded more dependable and significant results than the 16-gage sheets.

Fatigue Results

Welded Joints—Fatigue tests of fillet arc welds, reported by R. E. Peterson and C. H. Jennings (Westinghouse Electric & Mfg. Co.), were made on rotating specimens 2 in. in diameter in the middle part, with end sections of 1 in. diameter welded on by ring-shaped fillet welds of ¼- to ¾-in. size. Endurance limits of 15,000 to 20,000 lb. per square inch calculated on the 1-in. cross-section of the end pieces were found. Welds smaller than 0.30 in. broke in the weld, larger ones in the 1-in. shaft.

Raising Endurance by Understressing—Prof. J. B. Kommers (University of Wisconsin) studied the well-known ability of previous repeated-stress cycles to raise the endurance limit of many substances by making several sets of tests on cast iron and on Armco iron. The former, as expected because of its non-homogeneity, showed the largest effect. For an original endurance limit of 9,300, preliminary stressing at 9,000 lb. per square inch for varying numbers of cycles raised the limit by 24.7 per cent, if the cycles exceeded 15 million; fewer cycles gave a smaller increase. If the understressing was just at 9,300, 20 million cycles raised the limit by 31.2 per cent, while below 8,000 lb. per square inch the gain was constant at 16 per cent. Armco iron showed an increase of only 10 per cent in endurance limit (26,200 to 28,700 lb. per square inch for a normal specimen, 18,500 to 20,100 lb. for a notched specimen).

Nitrided Steel—Heat-treated chromium-molybdenum-aluminum steel had an endurance limit of 76,000 lb. per square inch; after nitriding, its endurance was 84,000, according to tests of N. L. Mochel (Westinghouse Electric & Mfg. Co.).

Cable-Sheath Metals—Continuing previously reported studies of endurance of cable-sheath alloys carried out by the Bell Telephone Laboratories, J. R. Townsend and C. H. Greenall found relatively high endurance in lead containing 0.04 per cent calcium. Creep tests also showed lower creep for this alloy than for a 1 per cent antimony lead. The endurance tests were made in a rotating machine, while earlier tests were made be reversed bending.

Fatigue and Corrosion—A further monumental contribution to the study of fatigue-corrosion relations was made by Dr. D. J. McAdam (U. S. Naval Engineering Experiment Station). He found that the initial rate of net damage in corrosion combined with cyclic stress varies as the third or fourth power of the stress. The accelerating influence of cyclic stress on corrosion is attributed partly to disturbance of the protective surface and partly to increase of solution pressure by cold working.

Some Other Metal Research Results

Phosphorus in Wrought Iron—Extensive tests by J. H. Higgins (Camden Forge Co.) for the wrought iron committee on iron with phosphorus ranging from 0.06 to 0.45 per cent showed increased strength and vibratory resistance with increasing phosphorus; the ductility was reduced slightly.

Thickness-Strength Relation in Cast Iron—Tests by A. L. Boegehold (General Motors Research Laboratories) confirmed the known fact that thick sections of cast iron are weaker and softer than thin sections cast from the same ladle. A similar conclusion was reached by M. V. Healey (General Electric Co.), who found that a 1-in. wall section showed better properties than thinner or thicker sections.

Embrittlement of Galvanized Steel—Occasional cases of brittleness of structural steel galvanized, as for transmission towers, led to the organization of a group to study the causes of the trouble, under direction of the corrosion committee (A-5). The group includes representatives of utility companies and the National Electric Light Association; it is headed by V. F. Hammel (Electric Bond & Share Co.). Preliminary work has already begun.

Manganese Steel—A summary of the status of medium-manganese steels by E. E. Thum brought out the value of manganese for high-strength structural steel and for rails. Structural material with 0.20 to 0.45 C and 0.80 to 1.80 Mn gives strengths of 80,000 to 100,000 and yield points of 45,000 to 55,000. Rail with 0.55 to 0.70 C and 1.20 to 1.60 Mn gives higher strength and safety than ordinary rail; it is being used in large and increasing amounts.

Merit of Alloy Steels—Merit-index calculations for various alloy steels by Prof. Bradley Stoughton and W. E. Harvey (Lehigh University) led to no specific conclusions, though the authors found that chromium, nickel and nickel-chromium steels took leading places in most of the comparisons. The steels studied range in cost from 3c. to 20c. per pound.

Stainless Steel—Certain bad results with stainless (nickel-chromium) steel are due, according to N. B. Pilling (International Nickel Co.), to the existence of an unstable zone of composition, between martensitic and austenitic steels. To avoid the trouble, increase either nickel or chromium. A steel of 18 Cr and 8 Ni was stabilized against the cold-work hardening effect of varied carbon by raising the nickel to 14 per cent. Dr. J. A. Mathews dissented from the conclusion.

Yield-Point Studies—An extensive report from the society's research committee on yield point of structural steel, by Prof. M. O. Withey (University of Wisconsin), based on data accumulated during three years, brought the conclusion that mill tests did not represent accurately the yield point or the ultimate strength of plates or shapes. It was found that if a single test specimen is to represent the strength of the entire shape, it should be taken: in channels and I-beams, from center of web; in angles, from the toe; in plates, intermediate between edge and center; and in H-beams and columns, intermediate between edge and center of flange.

Yield-point values were found to range from 0.51 to 0.66 of ultimate, with average 0.59; but less than half of the 56 individual shapes had yield-point ratios within 5 per cent of the mean.

Gagging heavy shapes produced only negligible effect on yield point, and contact with skids during cooling also had little effect.

Moduli of Spring Material—Two researches into spring material were reported. Prof. M. F. Sayre (Union College) reported some high-precision measurements of hysteresis loops and variation in modulus of elasticity on a number of spring metals, which showed that the stress-strain line is curved rather than straight, the modulus decreasing slightly as stress is increased. Temperature effects on torsional modulus of elasticity were studied by F. P. Zimmerli (Barnes-Gibson-Raymond, Inc.), W. P. Wood and G. D. Wilson (University of Michigan), in a range from —100 to 850 deg. F. Above 75 deg. F. the moduli generally decreased, as do those of carbon steels below this temperature; but alloy steels and non-ferrous metals show no regular change in this lower range. Stainless steel had a lower modulus than others. Monel metal was stiffer at all temperatures than phosphor bronze and brass.

Progress of Highway Improvements Under Cleveland's Regional Plan

History of Development of Cleveland Metropolitan Area and Results of Two Years' Construction Work on Co-ordinated Highway Plan Involving State, County, City and Town Roads

By J. Gordon McKay
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FIG. 1—WHITEHOUSE VIADUCT, CLEVELAND, ELIMINATING A HEAVILY TRAVELED AND DANGEROUS RAILROAD CROSSING

In June, 1928, the U. S. Bureau of Public Roads, working with the commissioners of Cuyahoga County, Ohio, submitted a regional plan for the development of highways within the metropolitan area of Cleveland, embracing a district within a radius of 30 miles from the center of the city. City, county and town roads were considered in the plan. It called for the improvement of 595 miles of highways, 204 miles of which were to be new construction and 391 miles reconstructed. Four new bridges, exclusive of those on new routes, were to be built, seventeen bridges widened or replaced and 55 grade crossings eliminated. The program was to be carried out in ten years at a cost of $63,078,000, Cuyahoga County paying $41,203,000 of this amount. After construction work was started on the plan it was found that despite the multiplicity of authorities and communities to deal with such a fine spirit of co-operation prevailed throughout the area that construction work was able to proceed much faster than was originally expected. As a result at the end of two years' work more than 30 per cent of the work has been completed and more than 40 per cent will be completed by the end of this year. Dr. McKay, in the following article, gives a history of the development of the Cleveland area, a sketch of the prevailing problems and an outline of the progress made to date. —Editor.

THE establishment and development of streets, highways and bridges in the Cleveland regional area has been greatly influenced by the physical location and topography. The intensive development of the downtown business district and adjacent residential districts close to the shore of Lake Erie during the early periods of Cleveland's growth has rendered further expansion to the north impossible. This has resulted in more rapid expansion in the other directions, with a natural concentration of traffic on the main arterial routes leading to the central business section of Cleveland.

Construction of adequate street and highway facilities in the area has been seriously impeded by three river valleys. The Cuyahoga River Valley winds in a northerly direction through the center of the county and the city of Cleveland; the Rocky River valley runs in the same direction 8 miles west of Cleveland; and the Chagrin River valley is located approximately 15 miles east of Cleveland.

Two bridges now carry the bulk of traffic across the Cuyahoga River in downtown Cleveland. On one of them, the Central Viaduct, there is an average daily traffic of 22,000 vehicles; the other, the Superior-Detroit bridge, carries 64,000 vehicles daily, an amount exceeded by only one single-deck traffic bridge in the United States (Queensborough Bridge, New York City). At the present time there are no satisfactory east-west crossings over the Cuyahoga and Rocky River valleys in the suburban zone south of Cleveland. The cost of constructing bridges over the Cuyahoga and Rocky rivers has materially delayed establishment of new routes and has resulted in a concentration of large volumes of traffic on a few main routes in the area.

The location of industrial plants and railroad facilities has hampered the normal development of highways and streets in the area. In the southeastern part of Cleveland, where there are a series of industrial belts, it is now planned to build a new road through industrial territory, a mile of which will be viaduct construction. The expensive construction of this project will ulti-

mately be less costly than the economic losses which now result because of traffic congestion and delay caused by the use of indirect routes.

The influence of Cleveland as a traffic center extends approximately 30 miles beyond the center of the city. Arterial highways radiate from the limits of the downtown business district as spokes of a wheel to the east, south and west. The existing arterial highways between the centers of traffic in the city of Cleveland and other centers of population and traffic in the area have not provided a sufficient number of main thoroughfares for the proper distribution of traffic. The heavily traveled routes converge as they approach the city, and in a number of instances the traffic from two or more routes flows into one city street. As a result the problem of providing adequate traffic facilities is more complex in the downtown section of Cleveland than in any other district in the Cleveland regional area. In 1928 more than 280,000 vehicles a day crossed the outer limits of the central business district of Cleveland.

Highway Development in the Area

Because of the tremendous increase in motor-vehicle registration during the early period of motor vehicle use, it was practically impossible for highway and street improvements to keep pace with the demands of traffic. In 1913 there were only 9,000 motor vehicles in Cuyhoga County, the central county of the regional area, while in 1921 there were 109,000, an increase of more than 1,100 per cent. In 1929 there were 300,000 motor vehicles registered in Cuyahoga County, approximately one-sixth of the total registration in the State of Ohio and more than the registrations in any one of 21 states.

The most notable progress in establishing and developing highways and bridges in the Cleveland regional area has been achieved during the period from 1921 to 1930. In 1921 only 36.4 per cent of the total mileage of paved highways was more than 14 ft. in width. The rapid increase in motor vehicle traffic, especially motor truck traffic, prior to 1921 resulted in imposing requirements upon road and bridge designs which could not be economically met by the types of roads and bridges that were built during the early period of highway development.

At the present time there are, on the Cuyahoga County system, exclusive of the city of Cleveland, 405 miles of pavement more than 18 ft. in width, compared with 50 miles of similar width of paving in 1921, an increase of approximately 720 per cent. The extensive widening and reconstruction program during the period from 1921 to 1930 has resulted in the replacement of the 10- and 14-ft. surfaces of inadequate thickness and width with modern, heavy-duty pavements varying from 20 to 56 ft. in width. There are now 262 more miles of paved county highways in Cuyahoga County than there were in 1921. In addition, approximately 150 miles of other county roads, whose traffic does not require a paved surfaces, have been imnproved with slag, gravel or similar types of surfacing.

More than $50,000,000 has been expended on the establishment and development of county and state highways alone in Cuyahoga County during the period from 1921 to 1929.

Improvements in Highway Planning

Although considerable progress had been made in highway improvements in the area, the county commissioners of Cuyahoga County in 1926 decided that the most economical and satisfactory method of attacking their increasingly difficult highway problems would be the establishment of a definite plan of improvement.

FIG. 2—HILLIARD ROAD BRIDGE ACROSS ROCKY RIVER
Typical of the class of bridges being built under the Cleveland regional plan.

In 1927, therefore, the U. S. Bureau of Public Roads was requested to co-operate in a survey of the highway and traffic conditions and in the formulation of a scientific plan of their improvement. The resulting survey included studies of the existing volume of traffic, future traffic, the source and destination of traffic, and the adequacy of existing roads and bridges. From these and similarly related studies the federal plan of highway improvement for the Cleveland regional area was developed. (See *Engineering News-Record*, Jan. 24, 1929, p. 152.)

The limits of the regional area are approximately 30 miles from the center of Cleveland and include Cuyahoga County and portions of the six surrounding counties. The highway plan definitely schedules all classes of improvements within this area: new construction of unimproved roads, reconstruction of existing unsatisfactory pavements, widening of narrow roadways, construction of new and reconstruction of old bridges, and the opening of new highways to provide more direct service and relieve congestion on parallel routes.

The plan is being followed throughout the region, and nearly all of the existing main highways have since been improved in accordance with the plan. Concentrated effort is now being directed toward the opening of the proposed new arterial routes.

Within the city of Cleveland a program of street improvement is adopted each year. These projects are usually selected from the general thoroughfare plan prepared by the City Planning Commission.

Recent Highway Improvements

Recent highway development in the Cleveland area has been based largely upon the expansion and modernization of the 10- and 14-ft. roads constructed during the early period of highway development. These pavements have been utilized to the fullest extent, and much of the plan consists of reconstructing and widening these old roads to serviceable traffic widths ranging from 20 to 56 ft.

The construction of extremely wide roads is not favored in the Cleveland area. A greater number of roads of moderate widths, parallel relief routes and new road openings provide a more balanced system for the distribution of traffic. The accepted maximum width is based on four free-moving lanes of travel which generally are provided for by a width of 40 ft. without curb in the rural area, 56 ft. with curb and curb parking in the urban areas, and 76 ft. with curb parking and car tracks in the urban areas.

FIG. 3—TRAFFIC CIRCLE AT INTERSECTION OF FAIRMONT AND WARRENSVILLE CENTER ROADS

Roadway Widening of Existing Routes

Among the recent widenings of existing roads which have been completed or are in process of construction are:

Center Ridge Road—U. S. Route 20, a heavily traveled main line from Buffalo to Chicago, was widened from 14 to 40 ft. through the city of Rocky River and the village of Dover to the Lorain County line, a distance of 8 miles.

West Lake Road—State Route 2, the Cleveland-Sandusky-Toledo Road, has been widened from 20 to 40 ft. through the city of Rocky River and from 18 to 24 ft. through Bay Village, a distance of 5.35 miles.

Brecksville Road—U. S. Route 21, the principal Cleveland-Akron highway, has been rebuilt and widened from 14 to 40 ft. from Rockside Road to the Summit County line, 7.84 miles.

Broadway—State Route 14 from Cleveland to Ravenna, East Liverpool and the southeast, was widened from 16 to 48 ft. through the cities of Garfield Heights, Maple Heights and Bedford, a distance of 6.16 miles.

Euclid Ave.—U. S. Route 20, the section of the Chicago-Buffalo Road east of Cleveland, is now widened to 56 ft. This is the most heavily traveled road in the county outside of the city of Cleveland.

East Ninth St.—The main north and south street of Cleveland's central business district, will be widened from 55 to 72 ft. by converting 8.5 feet of sidewalk space on each side. This is the first of a program of sidewalk conversions in the downtown area.

New Arterial and Bypass Routes

Another step in the modernization of roads in the Cleveland area has been the establishment of new arterials and belt routes. In some cases these roads are extensions of existing roads and in others they are new openings which link together existing roads, but, in general, they are complete new routes connecting important areas between which existing right-of-way has been utilized to the fullest extent possible.

Brook Park Road—Parts of this road, which will bypass Cleveland on the south and extent for 32 miles across the regional area, have been completed or are under contract. The entire project involves the opening of 24 miles of new roadway, the construction of a number of highway and railroad grade separations, and new bridges across the Cuyahoga and Rocky river valleys.

Independence Road—Largely a relocation of the existing road by the same name, forming a connection between the center of Cleveland and the Brecksville Road leading to Akron and the south. The new road requires about a mile of viaduct construction through the industrial section of the Cuyahoga River valley and bypasses the congested districts of Cleveland. It will have a width of 40 ft.

Northfield Road—State Route 8, is a new 40 ft. road between the southern limits of the city of Bedford and Cleveland. It will bypass the business section of Bedford, through which the present road runs, and provide better grades and curves.

Shaker Boulevard Extension—Shaker Boulevard is a main artery leading east to the city of Shaker Heights. Its western terminus is now just inside the Cleveland city line. The proposed extension will carry Shaker Boulevard west to the central business section of Cleveland over a depressed express roadway planned for through traffic. Its width will be 40 ft.

Lakefront-St. Clair—A parallel relief route for Lake Shore Boulevard and other routes to the east. It utilizes some existing right-of-way but is mainly a new opening. From East Ninth St. to East 72d St. it will be an express roadway built on land reclaimed for harbors along the lake front. Width 40 ft.

Fairmont Road—A parallel relief route for Cedar Glen and East Boulevard. From Baldwin Road to East 116th St. the route is a relocation of the present Fairmont Road. Grades and alignment are bettered by a scenic hillside route through rugged park land.

Carnegie Ave.—This street has been developed through progressive widenings and openings into the major route to the east from downtown Cleveland. It has been converted from a narrow disconnected minor thoroughfare to a straight, clear thoroughfare 56 ft. wide on an 80-ft. right-of-way. Leading from East 22d St. to East Boulevard and serving as a parallel relief route for Euclid Ave. on the south, it has become the main access to the "Heights" east of Cleveland.

Chester Ave.—When completed Chester Ave. will assume practically the same importance north of Euclid Ave. as Carnegie Ave. now has south of Euclid Ave.

Bridges and Grade Separations

The Rocky, Cuyahoga and Chagrin river valleys offer serious obstruction to the extension of new roads east and west of Cleveland. These valleys, in general, are narrow but deep, so that expensive high-level bridge construction is required. Cuyahoga Valley is rather broad and shallow, but its river is nevigable so bridges spanning it must provide full clearance or a movable span. New valley crossings are essential to any plan of traffic relief as units of the new arterial routes.

In the downtown district of Cleveland the Lorain-Central bridge across the Cuyahoga River is now under construction. This bridge is located south of the Superior high level bridge, whose daily traffic now

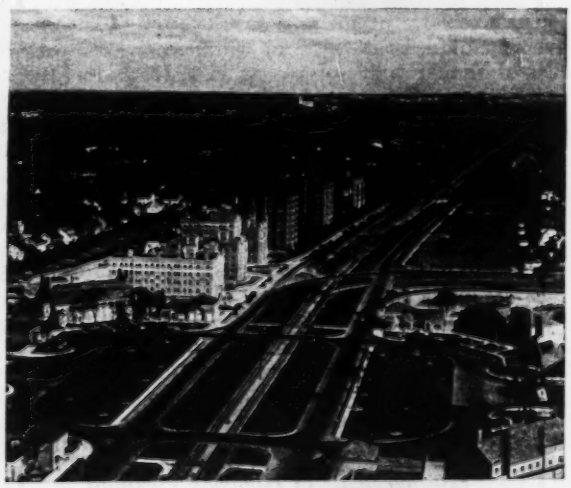


FIG. 4—SHAKER HEIGHTS BOULEVARD AT SHAKER SQUARE

Two lanes of roadway and two rapid transit tracks on main thoroughfare. Side roads have been provided for parking and access to buildings, thus clearing the main road for through traffic.

exceeds 64,000 vehicles. A bond issue for another bridge, planned at Main Ave. just north of the Superior high level bridge, will be submitted to the voters at the fall election. Both of these bridges will have a 60-ft. vehicular roadway. The estimated cost of the Lorain-Central bridge is $8,000,000 and of the Main Ave. bridge $6,000,000.

The Hilliard bridge, over the Rocky River valley, has been recently completed and has opened Hilliard Road to the west and southwest as a relief to Center Ridge Road, U. S. Route 20.

Another Cuyahoga crossing is planned to replace the existing bridge on Royalton Road, State Route 82, and an additional Rocky River crossing will be provided at the entrance to Lake Erie as part of the proposed lake-front connection between Lake Ave. on the east and West Lake Road on the west.

The state, Cuyahoga County, city of Cleveland and the various railroads in the Cleveland area are carrying on an extensive program of grade-crossing elimination. Within the city of Cleveland grade separations have been completed, or are in process of separation, on the main arterial routes. The most notable project on the program is the White House crossing, which was completed late in 1929.

Several highway grade separations are planned in the Cleveland area. The most important of those completed to date are to be found on Shaker Boulevard. Separations are provided for the main intersections on the new section running east from Warrensville Center Road. This new section of Shaker Boulevard is a double strip roadway with rapid transit tracks in the center.

Design of Intersections

There are many examples of complicated intersections in the Cleveland area where five or more roadways meet at the same point. Seven-way intersections, well spread out and meeting at odd angles, are not uncommon. The more important of these are under study and plans for their betterment are being developed.

Intersections are a very important factor in rapid traffic movement, and much care is being devoted to their design in new construction. The approaches to the new Lorain-Central and Main Ave. bridges are problems of complicated intersections. A separation of grades is proposed for the west end of the Main Ave. bridge and a traffic circle for the east end of the Lorain-Central bridge.

Control Over Highways

The successful completion of highway projects in the Cleveland area depends to a large extent upon close co-operation among the various controlling agencies involved. The laws of the State of Ohio delegate to each incorporated municipality authority over the roads and streets within its limits. More than 93 per cent of the area of Cuyahoga County is now incorporated and includes, according to the 1930 census, twelve cities and over the state and county roads and village streets which lie within its boundaries. Before it can build a road the country must obtain the consent of the municipalities involved in the improvement. This frequently requires considerable time in order that the details of design, type of pavement and apportionment of the cost of the improvement can be satisfactorily settled. In addition, property owners affected by special assessments must also agree to the cost which they will assume.

One of the most important projects in the regional area, which will bypass the city of Cleveland on the south, involves the improvement of 8 miles of existing roads and the opening up of 24 miles of new road. This project is controlled by nineteen administrative jurisdictions, all of which must agree to the details of the improvement and distribution of the cost of the project prior to its construction.

FIG. 5—WEST END OF TERMINAL DEVELOPMENT AND EAST APPROACH TO SUPERIOR HIGH LEVEL BRIDGE

Traffic at present on this bridge is more than 63,000 vehicles daily. Viaducts in foreground carry Huron Road and Prospect St. over railroad tracks in the terminal area.

Despite this multiple control over highway improvements, rapid strides have been made in the improvement of roads and streets in the regional area. Excellent co-operation now exists among the state, county, city of Cleveland and other municipalities. This has been brought about in a large measure by the active participation of these units in the formulation of the plan of highway improvement for the Cleveland regional area in 1927. The unbiased nature of this plan won the support of practically all the municipalities and civic associations in the area, with the result that active co-operation now exists in all improvement proposals.

The county exercises the initiative in the improvement of county roads. It is following the adopted plan of improvement very closely and has stabilized its annual highway budget. The financing of road projects is now done by current revenues, and only major structures are financed by bond issues.

Although the co-operative efforts of the numerous controlling highway authorities have produced very good results in the improvement of highways in the Cleveland area, experience has indicated that even greater accomplishments could be achieved by the centralization of control under a regional type of government. The same problem of multiple jurisdiction exists in regions in and around the larger cities where the influence of the central city has expanded beyond its boundary lines.

The work is being carried out under the direction of the author as director of the Cleveland Highway Research Burea, co-operating with the following: Gov. M. Y. Cooper; Robert Waid, director of highways, State of Ohio; Cuyahoga County Commissioners J. R. Zmunt, W. E. Cook, J. Harris; Fred R. Williams, county engineer; D. E. Morgan, city manager, Cleveland; John B. Marshall, mayor, Cleveland; Robert Hoffmann, commissioner of engineering and construction, Cleveland; and George Sowers, deputy commissioner of engineering and construction, Cleveland.

News of the Week

Congress Clears Way for Boulder Dam Construction

Both Houses Pass Appropriation Over Objections by the Arizona Senators

AFTER nine years of debate, Congress has removed all the obstacles to the commencement of construction of the Boulder dam project. Over the protest of the Arizona senators the Senate on June 27 approved the item in the second deficiency bill providing an appropriation of $10,660,000 for starting the work. The House already has indorsed the bill including the appropriation. Barring court interference, there is nothing now that can prevent completion of the project.

Vigorous objections were raised by Senators Ashurst and Hayden, of Arizona, who claim that the construction of the dam and the accompanying works will deprive their state of its proper share of water from the Colorado. It is contended by Arizona that 3,500,000 acre-ft. should be allocated to its lands. Realizing that the cloture rule would be invoked against them if they prolonged the debate indefinitely, the Arizona senators made their protests brief.

Arizona Senators Protest

Senator Ashurst attacked the validity of the contracts for the disposal of part of the power to the Los Angeles bureau of power and light. He expressed the opinion that the taxpayers of Los Angeles are not bound by this contract and cannot be bound to stand behind the bureau if the terms of the agreement are not carried out. Senator Hayden questioned the advisability of appropriating money for the construction of the dam when the plans for the design of the structure are not complete. He favored a smaller appropriation to be used for further engineering studies and surveys. Other senators from states in the Colorado basin approved of the initial appropriation but stated that the entire situation should be studied again when funds are requested to construct the so-called All-American Canal.

It was brought out that the time for Arizona to make its final appeal for its share of water will be when the construction of the All-American Canal is about to be started. This canal rather than the dam will be the means of securing a division of water, it was stated. The sentiment was expressed in the course of the discussion that the dam should be of ultra-conservative design, since the destruction caused by its failure would be great.

General Deakyne to Remain in Service as Colonel

The secretary of war has approved the application of the Chief of Engineers, Major-Gen. Lytle Brown, for authority to assign Brig.-Gen. Herbert Deakyne, assistant to the Chief of Engineers, to duty in his office as a member of the board of engineers for rivers and harbors, after the expiration of his tour of duty as assistant to the Chief of Engineers. Therefore General Deakyne has reverted to his permanent rank of colonel, Corps of Engineers.

Under the law, General Deakyne could have retired as a brigadier-general prior to the expiration of his tour. Continuing in the service, he will now retire when he reaches the age of 64 on Dec. 29, 1931, as a colonel, Corps of Engineers.

American Company to Build Dam in Chile

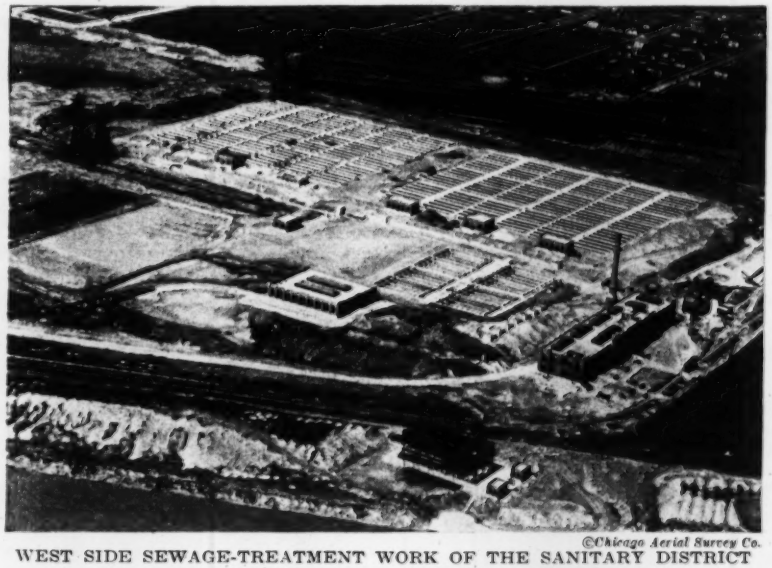
The department of irrigation of the Republic of Chile has awarded to the Ambursen Dam Co., of New York and San Francisco, the contract for the construction of a multiple arch dam at Puente Negro, on the Choapa River, in the Province of Coquimbo. The dam will be about 200 ft. high and will cost approximately $1,000,000. Work will be begun immediately and it is expected that the dam will be completed in 1931.

Chicago Sanitary District Reports to Supreme Court

Diversion Decreased as West Side Plant Begins Operation—More Bonds Needed

IN CONFORMITY with the decree of the U. S. Supreme Court, the Sanitary District of Chicago on July 1 submitted the first of a series of semi-annual reports on the progress of sewage-treatment works and diversion of water from Lake Michigan. "The extent of the operation of the plants is equal to the 100 per cent treatment (85 per cent purification) of the sewage of 1,144,000 persons out of a possible 4,625,700 which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 5,442,000 was being treated."

The permit of March 3, 1925, authorized a diversion of 8,500 sec.-ft. plus domestic pumpage, which brought the authorized flow to about 10,000 sec.-ft. The actual flow for 1929 was 9,450 sec.-ft. The permit of Dec. 31, 1929, authorized a total flow of 8,500 sec.-ft., or a reduction of 16 per cent. The actual net flow has been 8,495 sec.-ft., varying from 7,745 sec.-ft. in January to 9,745 in April. On July 1 the net diversion was reduced to 6,500 sec.-ft. and will continue at that figure until



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WEST SIDE SEWAGE-TREATMENT WORK OF THE SANITARY DISTRICT OF CHICAGO STARTED OPERATION JUNE 2

One of two batteries of Imhoff tanks is in operation, and the second, near towers, is nearly done. At the lower right are the eight skimming tanks of fifteen-minute detention, grit chambers and coarse screen house. The main pumping station and large outdoor substation supplied from five independent lines are complete and now capable of handling the sewage of 1,850,000 people, the ultimate designed capacity.

Dec. 31, 1935. The time has not yet been sufficient to show any marked changes in the condition in the Drainage Canal because of either the increased treatment or reduced dilution water.

Of greatest import is the placing of the West Side project into operation June 2. One of the three batteries of Imhoff tanks (total capacity 480 m.g.d.) is completed, the second nearly so. New contracts were let early in 1930 for a sludge bed cleaning machine. Sewage sufficient to utilize most of the capacity of battery A will soon be turned in. This plant was described fully in *Engineering News-Record*, March 1, 1928.

The North Side project is operating under partial load with 680,000 tributary people. Financial difficulties last year deferred completion of the North Branch pumping station, but it is now practically completed. It will deliver to the works all of the remaining sewage to be served in the northern portion of the district.

A site for the Southwest Side plant is being acquired, some 2,400 separate tracts of a subdivision being involved, with severe opposition by local objectors to be overcome.

Finances of the district for new construction must come from bond issues submitted to referendum. An exception for $27,000,000 was authorized by the state legislature in 1929; of this amount $16,850,000 remains to be issued and will be required for construction during the next twelve months. The program to meet the legal decree calls for $20,000,000 expenditures per year, and the district recently petitioned the state, without success, to authorize the issue of $120,000,000 to carry out the decreed program. As bond issues are unpopular in Chicago, putting a bond issue for the district on next fall's ballot is likely to prove little more than a gesture.

J. T. Thompson to Be Manager of International Road Congress

J. Trueman Thompson, professor of civil engineering at Johns Hopkins University, has been appointed manager of the Sixth International Road Congress, which will meet in Washington Oct. 6 to 11 at the invitation of the United States government. Professor Thompson has been a member of the faculty of the Johns Hopkins school of engineering for the past ten years, and since 1921 he has served as specialist in highway research for the U. S. Bureau of Public Roads.

The meeting in Washington will mark the first time that the international conference of highway experts has been held in the Western Hemisphere, previous sessions having been held in Paris, Brussels, London, Seville and Milan. Invitations to send delegations have been accepted by 45 nations.

In connection with the congress there will be an exposition of road machinery and materials under the auspices of the American Road Builders Association.

Commission Grants Approval for Pacific Coast Railroad Link

Approval by the Interstate Commerce Commission has been given for joint construction by the Great Northern and Western Pacific railroads of approximately 200 miles of new railroad between Klamath Falls, Ore., and Keddie, Calif. The construction will link the Great Northern lines with those of the Western Pacific, and open up the port of San Francisco and other California seaports to traffic from the Northwest in competition with the Southern Pacific Co.'s lines.

The Great Northern's construction involves 87½ miles of new line between Klamath Falls, Ore., and Bieber, Calif., at a cost estimated as $3,294,620, while the Western Pacific's new line will extend from Keddie to Bieber, 112 miles, connecting with the Great Northern at Bieber, and will cost about $9,800,000.

The two roads were authorized to acquire control and operate a 36-mile line of railroad extending westward from Lookout, just north of Bieber, to a connection with the McCloud River Railroad at a point near Hambone, Calif.

Rio Grande Changes Course, Curtailing Brownsville's Water

A difficult situation has occurred at Brownsville, Tex., with respect to the city water supply, taken from the Rio Grande, which has the habit of changing its course at unexpected intervals. The recent high water caused a channel to be cut across the neck of the horseshoe bend in the river, bypassing a portion of the water away from the city intake at the opposite end of the bend. This virtually changed the course of the river and threatened to leave Brownsville stranded for water. This will be made clear from the accompanying illustration.

The new channel diverts a portion of the flow and in times of low water may carry the entire flow of the river. In that case the city intake would have to be extended or the river channel proper dredged to insure an adequate supply. According to V. M. Ehlers, chief sanitary engineer of the Texas state department of health, some question might also arise regarding "no man's land" created by this cutoff.

City Manager Z. A. Rosenthal is to call a conference of prominent engineers to decide what is best to do about it, whether to build a new intake works or to acquire property rights which will permit making the abandoned riverbed a settling basin for the city supply and move the pump station toward the entrance of the bend.

19-Story Arc-Welded Building Under Way in Dallas

Excavation has been completed and footings have been set for a nineteen-story completely welded building for the Dallas Power & Light Co. in Dallas, Tex. This is the tallest welded structure yet undertaken. The Westinghouse Electric & Mfg. Co. has just completed the steel frame of a new laboratory at its East Pittsburgh works which is eleven stories high and is completely arc-welded. A similar building is being erected in Boston for the Edison Electric Illuminating Company of Boston, but this structure is shop-riveted and field-welded. The steel for the Dallas building will be fabricated and erected by the Mosher Steel & Machinery Co. Lang & Witchell are the architects and R. L. Rolfe is structural engineer. Frank P. McKibben, consulting engineer, General Electric Co., has been retained in connection with the welding. Dallas is the largest city in the United States to sanction in its building code the use of welding in the construction of buildings.

$1,000,000 Fire in Chicago's Municipal Airport

Fire at the municipal airport in Chicago on June 25 destroyed three hangars and 36 airplanes, causing damage estimated at more than $1,000,000. Among the airships destroyed were ten trimotor planes owned by the Universal Air Lines, valued at $60,000 each.

AIRPLANE VIEW SHOWING HOW RIO GRANDE CHANGED ITS COURSE

Committee Meets to Consider Plans for Hydraulic Laboratory

CONSTRUCTION plans for the national hydraulic laboratory were initiated at a special advisory committee meeting held June 25 in Washington, which was attended by hydraulic engineers from all federal departments concerned and from private practice. Now that an appropriation of $350,000 for construction and $50,000 per year for operation is going forward in the second deficiency bill, the plant is to be built as soon as suitable plans are made.

According to G. K. Burgess, director of the Bureau of Standards, the meeting was a successful and harmonious one wherein numerous ideas were advanced concerning the plant set-up and its use. John R. Freeman, originator of the project, presented detailed plans and estimates showing that a laboratory equal to any in the world can be constructed with the funds provided.

Membership of the advisory committee, which will meet again July 14, was given in *Engineering News-Record*, June 26, p. 1072.

Jadwin to Head Reorganized Federal Power Commission

President Hoover on July 1 announced that he had decided upon Lieut.-Gen. Edgar Jadwin, former Chief of Engineers, as the head of the new Federal Power Commission, the reorganization of which was approved by the President June 24 (*Engineering News-Record*, June 26, p. 1069). Names of the other members of the commission have not yet been made public. General Jadwin's appointment will not come before the Senate immediately, as it is the President's intention to submit the entire list of appointments at one time. The new commission is to consist of five full-time members, who will take over the duties formerly discharged by the secretaries of war, agriculture and interior.

General Jadwin, who was graduated from the U. S. Military Academy at West Point in 1884, served continuously with the Corps of Engineers from that date until Aug. 7, 1929, when he was retired with the rank of lieutenant-general. He was for four years engaged in the construction of the Panama Canal. During the war he commanded the 15th Engineers in France, also serving as chief engineer, advance section, line of communications, A.E.F.; as director of the division of construction and forestry and as director of light railways and roads. In 1919 he was detailed to the American mission to Poland. Appointed assistant Chief of Engineers in 1924, he was advanced to the post of chief upon the retirement of Major-Gen. Harry Taylor in 1926, serving until he reached the age limit last summer.

New Cleveland Union Terminal Officially Opened June 28

Cleveland's new union railroad terminal was officially opened to the public on June 28. Full schedule of passenger train services, embracing about 100 trains daily, went into effect early the following morning. At present all trains of the New York Central, Big Four and Nickel Plate railroads will use the new terminal. Other roads, including the Baltimore & Ohio, Erie, and Wheeling & Lake Erie will come into the new station before long.

The entire terminal district is electrified and all trains are handled by 22 of the most powerful electric locomotives ever built. Included in the terminal area are the Terminal Tower Building, 708 ft. high; the existing Hotel Cleveland and its proposed 700-room addition; the Medical Arts Building, the Builders Exchange Building, both eighteen stories and already completed; and the new post office, the eighteen-story Midland Bank Building and a new department store, under construction or proposed. The new terminal area adjoins the Public Square in the heart of the city and comprises about 35 acres of land.

Within the station are now thirteen tracks and six platforms for railroads and six tracks and seven platforms for commuter and rapid transit service. The initial layout consists of 42 miles of track and 450,000 sq.ft. of platform, with ample room for expansion of both tracks and platforms as the need arises. A viaduct 3,500 ft. long carries the four tracks of the west approach across the Cuyahoga River valley. The terminal was built by the Cleveland Union Terminal Co. under the direction of A. Jouett, chief engineer.

No Rehearing in Los Angeles Union Station Case

The California supreme court has denied the petition of the Union Pacific System and the Atchison, Topeka & Santa Fe Railway for a rehearing of the court's recent order upholding a decision of the California railroad commission in which those carriers were directed to proceed immediately with the construction of a union passenger station in the vicinity of the Plaza district in the city of Los Angeles.

"Iron Trade Review" Becomes "Steel"

The Penton Publishing Co., Cleveland, Ohio, announces that beginning with the July 3 issue, *Iron Trade Review*, which has served the steel industry for 48 years under that title, becomes *Steel*. According to the announcement by the company, the new name has been adopted because it defines the scope and purpose of the publication more accurately.

Herschel Will Cites Need for Practical Hydraulic Research

PUBLICATION of the will of the late Clemens Herschel, eminent hydraulic engineer, throws light on the reasons which impelled him to establish a trust fund of $50,000 which will eventually be used for the construction of a hydraulic research laboratory at Harvard University. The paragraph containing this provision reads, in part, as follows:

For many years I have endeavored to aid in the establishment of an endowed hydraulic observatory in which the study of applied practical hydraulics could be pursued experimentally in a continuous manner by skilled workers and observers.

It has seemed to me lamentable that so much of the welfare of mankind as is dependent on this art should fail to be promoted by the non-existence of an establishment of this sort; especially when it is considered how many millions of money are being applied to the pursuit of sciences, confessedly of no use to mankind, immediate or discernible in the future.

I know well the argument that groping, even aimless, research must precede applied science; but have found that practical inventions more often precede their scientific explanation; while aimless research only too often results in nothing better than having its printed record encumber the shelves of libraries.

Theoretical Study Useless

I have myself suffered by reason of being disqualified because I did not pursue what some are pleased to term "pure science," the scientist in charge of a several million dollar endowment, located in the city of Washington, having refused to aid me in making certain needed hydraulic experiments, claiming that the funds in his charge were to be used, if at all in the study of hydraulics, only in the study of theoretical hydraulics, than which, to my mind, there could be no greater delusion, perversion of the trust funds of the original practically minded donor and founder, and neglect of duty toward mankind in general; the study of theoretical hydraulics having proved a wholly barren field for several centuries, and of about as much use or application to the welfare of mankind as the work of a certain German professor who spent his whole life in translating the Latin classics into ancient Greek.

I have allowed myself thus to exhibit my thoughts on this subject matter, so that my own present intents and purposes may by contrast be in general indicated to the beneficiaries interested about to be named.

Mr. Herschel then proceeds to direct the president and fellows of Harvard to invest his bequest until it shall have grown to a total of $500,000, after which they were to be free to use this entire amount, or any part of it, for the construction and maintenance of the laboratory. These directions are canceled, however, by a codicil dated Feb. 20, 1928, which annuls the directions for accumulation and reaffirms the gift without condition. His purpose in doing this is explained in a letter addressed to the officials of the university:

In reading the clause in my will that contingently gives you $50,000, please consider that it was first composed many years

ago, though enlarged in some respects subsequently. One original feature of it I have this day annulled by codicil, and am writing this letter to take its place. I let the original remain, instead of destroying it, to serve historically as a portrayal of, or reaction from, men's minds in the past.

I was one of the first to argue for the establishment of hydraulic observatories. This I did on every occasion that presented itself, and even at times when I had to make the occasion. Today the situation has radically changed. At home and abroad, hydraulic observatories are in existence, are being enlarged, and new ones are being founded. . . . Such small observatories, insufficiently or not at all endowed for their operation, will no longer satisfy the demands likely to be made upon them. . . .

With these views in mind, I have sought to induce a number of engineers to make bequests similar to mine to Harvard College. And in consideration of all this, my wish is that either by natural increase from adding earnings to the original bequest, or by the addition of similar bequests or appropriations, or by these several means of increase, my original bequest be allowed to increase, until it shall amount to at least $200,000 (better $250,000) before the hydraulic observatory I had in mind be founded and its continued operation is begun, this much capital or endowment being necessary, as I view it, in order that proper work may be done.

I do not want to make these wishes conditional as to the bequest, feeling that a mere statement of them is sufficient to command from you their proper consideration.

City Engineer Loses Legal Fight for Reinstatement

The Arkansas supreme court has handed down a decision dismissing the injunction suit of City Engineer Chris L. Wright, of Pine Bluff, against the Sixth-Fifth-Ohio street paving district, which ousted him as engineer of the district and named Hugh R. Carter as his successor. This decision reversed that of Chancellor Lucas, which enjoined the commissioners from ousting Wright. Immediately after the decision was announced, the city council approved plans for the expenditure of $262,837 for construction of concrete streets throughout the district.

Three New Bridges Approved for Allegheny County, Pa.

Three bridge items involving nearly $3,000,000, which were provided for in the $21,000,000 bond issue of 1928, have been approved by the Allegheny County (Pa.) grand jury. They are: new bridge, to cost $57,000, across Flaugherty Run, Moon township, 60 ft. wide, to replace an old structure; new bridge, to cost $900,000, across Youghiogheny River, between Boston village and Versailles township, to replace a smaller structure; new bridge, to cost $1,925,000, across the Monongahela River, from South Tenth and Carson Sts. to Armstrong Tunnels and Second Ave., Pittsburgh.

The Business Outlook

The business tide reached its low ebb during the past two weeks, and is beginning to turn, very slowly and tentatively, in the face of a strong current of peevish, superficial and premature pessimism. There will be no noticeable change in the next few weeks. Progress will be slow, irregular, spasmodic, with sporadic relapses, successively less frequent and sharp, till the end of July. Then a decisive recovery will set in.

This forecast is not based solely on the sharp circumstantial rise in our index from the low point of 88.8 per cent of normal last week to 93.6 this week. Other statistical straws suggest strongly that the confused economic currents are setting more uniformly in the direction of recovery.

—The Business Week, July 2.

Advisory Board Created for Westinghouse Laboratories

A scientific advisory board has been created by the Westinghouse Research Laboratories, East Pittsburgh, Pa., which will meet three times a year to follow closely all research work conducted by the company and act in an advisory capacity on matters of a purely scientific character. Members of the board are: P. W. Bridgman, head of the department of physics, Harvard University; G. B. Waterhouse, head of the department of metallurgy, Massachusetts Institute of Technology; C. E. Mendenhall, head of the department of physics, University of Wisconsin; Stephan Timoshenko, head of the school of advanced mechanics, University of Michigan; and Edward Mack, Jr., professor of physical chemistry, Ohio State University.

Water Company for Chicago Suburban Towns

A new permit of "necessity and convenience" has been granted the Greater Chicago Lake Water Co. to furnish water to towns within a radius of 35 miles of Chicago. The present plans call for an intake 3 to 5 miles offshore in Lake Michigan opposite Wilmette, in the vicinity of which town will be located low-lift pumps to force the water by pipes to a filtration plant near Norwood Park. A high-lift station will be located near the center of distribution, which in past plans has been designated as 22d St. and Harlem Ave.

S. M. Savage, engineer, states that work will not start until several towns have contracted to take the water. Cicero passed such a contract ordinance June 2 and Berwyn is expected to follow soon.

Brief News

PRESIDENT HOOVER on June 26 signed a bill creating the Great Lakes Bridge Commission and authorizing it to construct and operate a bridge across the St. Clair River from Port Huron, Mich., to Sarnia, Ont.

THE NEW TOLL BRIDGE across the Tennessee River 5 miles from Perryville, Tenn., will be dedicated on July 5. This bridge, which is 3,800 ft. long, will shorten considerably the highway route between Memphis and Chattanooga.

THREE NEW MUNICIPAL AIRPORTS, located in Niles, Manistee and Newberry, will be dedicated July 11, 12 and 14, respectively, during the second annual Michigan air tour, sponsored by the Pontiac Board of Commerce.

ELECTRIFICATION of the French Southern Railway, connecting Paris with the Riviera, will be completed in 1934, it is expected. This year 27 km. will be finished. The electric current will be generated from hydro-electric power plants in the Pyrenees Mountains. The work is being done by German companies on reparation account.

NIPAWIN BRIDGE, spanning the Saskatchewan River about 75 miles east of Prince Albert, has been completed. This bridge, which was built for the Canadian Pacific Railway at a cost of approximately $2,000,000, is 1,907 ft. long, and in addition to serving the railroad has a lower deck with a 16-ft. highway for vehicular traffic, designed for 15-ton loading.

STANDARD MARKERS for numbered routes in the United States system of highways will practically all be in place at the end of the construction period of 1930, reports to the U. S. Bureau of Public Roads indicate. The system was adopted less than five years ago by state highway departments, and covers approximately 97,000 miles of the important highways of the nation.

CONSTRUCTION OF A BRIDGE nearly 2 miles long to connect the southern extremity of Padre Island with the mainland at Point Isabel, Tex., will be started as soon as plans are drawn. The structure will span the Laguna Madre, and will be equipped with two drawbridges, will be of wood construction, and will have a runway 19 ft. wide, bordered by a passage 4 ft. wide for pedestrians.

A CIVIL SERVICE EXAMINATION for the position of junior engineer, to fill vacancies in various branches of the service throughout the United States, will be held soon, and applications must be on file with the Civil Service Commission at Washington not later than July 8. The entrance salary is $2,000 a year. Competitors will be rated on general physics, mathematics, and optional subjects chosen from a list including civil engineering and structural steel and concrete engineering.

Personal Notes

Major GORDON R. YOUNG, who has been U. S. district engineer at Kansas City, has been assigned to the 13th Engineers at Fort Humphreys, Va.

ROY V. WRIGHT, managing editor, *Railway Age*, New York City, has been selected by the nominating committee for president of the American Society of Mechanical Engineers for 1931.

Lieut.-Col. EDMUND L. DALEY, who has been in charge of the river and harbor desk in the office of the Chief of Engineers in Washington, has been ordered to Kansas City to serve as district engineer.

ROBERT GARRETT, chairman of the Public Improvement Commission, Baltimore, Md., since its establishment almost ten years ago, has resigned from both the chairmanship and membership on the commission.

THOMAS H. HANRAHAN, of Buffalo, has been appointed by Governor Roosevelt as a member of the Niagara Frontier Bridge Commission, to fill the vacancy caused by the resignation of Emanuel Boasberg.

GEORGE A. TAFT has been appointed assistant city engineer at Ogdensburg, N. Y. Mr. Taft held the position of city engineer prior to 1926, when the board of control was created and Charles H. Lord was named city engineer.

WILLIAM H. BARTON, JR., assistant professor of highway engineering at the University of Pennsylvania, has resigned to accept the position as head of the department of civil engineering at the Pennsylvania Military College, Chester, Pa.

HOLLIS R. THOMPSON has been appointed city manager of Berkeley, Calif., to succeed John N. Edy, who recently resigned to accept a similar position in Flint, Mich. Mr. Thompson has been managing director of the Berkeley Chamber of Commerce for the past 2½ years.

RUSSELL WOODBURN, until recently with the Erie Railroad as engineer and inspector on construction projects, stationed at Wellsville and Hornell, N. Y., is now connected with the Missouri state highway commission, engaged in locating the state system of "farm to market" highways.

P. M. ROSSMAN, construction superintendent with the Trojan Engineering Corp., New York City, is building a 54-mile, H-frame, 66,000-kv. line to connect the Wisconsin Hydro-Electric Co. properties with the Eastern Minnesota Power Co. properties. The preliminary survey for the line was made by airplane.

HARLEY B. FERGUSON, colonel, Corps of Engineers, has been appointed a member of the board of engineers for rivers and harbors, in the place of Col. George B. Pillsbury, who has been made assistant Chief of Engineers. Colonel Ferguson will retain his duties as division engineer of the South Atlantic Division, with headquarters at Norfolk, Va.

CHARLES FELTON SCOTT, professor of engineering at Yale University, was awarded the Lamme medal at the convention of the Society for the Promotion of Engineering Education, held in Montreal June 25-27. The medal is awarded by the society each year to a chosen technical teacher for accomplishment in technical training or actual advancement of the art of technical training.

MURRAY BLANCHARD, for eleven years hydraulic engineer, division of waterways, State of Illinois, has opened an office in Chicago for consulting practice in various lines of hydraulics, foundations and flood control. Since graduation from the University of Michigan 32 years ago he has been connected continuously, with the exception of war service in France, with hydraulics and heavy construction work.

GEORGE E. J. PISTOR, of New York, treasurer of the American Institute of Steel Construction, will sail on July 3 for a two months' tour of Europe. While abroad he will deliver addresses before the Institute of Mechanical Engineers, London; the Royal Institution of Engineers and the Association of Dutch Architects at The Hague, Holland; and the French structural steel interests in Paris. He will also attend the International Congress of Steel Construction at Liége, Belgium.

Society Calendar

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York; annual convention, Cleveland, Ohio, July 9-11.

AMERICAN WELDING SOCIETY, New York; fall meeting, Chicago, Sept. 22-27.

NATIONAL SAFETY CONGRESS, Chicago; annual meeting, Pittsburgh, Pa., Sept. 29-Oct. 3.

AMERICAN GAS ASSOCIATION will hold its twelfth annual convention and exhibition in Atlantic City Oct. 13-17. One of the principal subjects of discussion will be the development of natural gas.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS held its 46th summer convention in Toronto beginning June 23. Officers were elected as follows: president, William S. Lee, consulting engineer and president of the W. S. Lee Engineering Corp., of Charlotte, N. C.; vice-presidents, I. E. Moultrop, Boston; H. P. Charleworth, New York; T. N. Lacy, Detroit; C. C. Shaad, Lawrence, Kan.; H. V. Carpenter, Pullman, Wash.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, at its convention in Minneapolis on June 27, nominated the following officers for 1931: president, W. H. Carrier, Newark, N. J.; vice-presidents, Prof. F. B. Rowley, University of Minnesota, and W. T. Jones, Boston; treasurer, F. D. Munsing, Philadelphia. Election will take place at the winter meeting in Pittsburgh in January.

GRAND RAPIDS ENGINEERS' CLUB, Grand Rapids, Mich., at its recent annual banquet inducted the following new officers into office; president, George H. Waring; vice-president, C. D. Malloch.

INTERNATIONAL BUDGETING CONFERENCE will be held at Geneva, Switzerland, under the auspices of the International Management Institute, July 10, 11 and 12. Among the papers to be presented by Americans are: "Budget Principles and Procedures in Their Broader Aspects," by Louis F. Musil, director of finance, Henry L. Doherty & Co.; "The Budget as an Aid to the Determination of Policy," by James O. McKinsey, James O. McKinsey & Co., Chicago; "Common Mistakes and Misunderstandings in the Use of Budgets," by Harold V. Coes, manager, industrial department, Ford, Bacon & Davis, Inc., New York. The conference will be attended by delegates from Belgium, France, Germany, Great Britain, Italy, Switzerland, Canada and the United States.

LOS ANGELES SECTION, American Society of Civil Engineers, held a ladies' night on June 17. The affair was held in a Spanish cafe and Spanish music and dancing entertained the guests.

NEW ENGLAND WATER WORKS ASSOCIATION will hold its 49th annual convention at Atlantic City Sept. 23-26. Frank J. Gifford, 715 Tremont Temple, Boston, Mass., is secretary.

NORTH CAROLINA SOCIETY OF ENGINEERS held its annual convention at Wrightsville Beach, near Wilmington, on June 27. George F. Syme, of Raleigh, delivered an address, describing the movement to establish a 12-ft. channel in Cape Fear River.

Obituary

RICHARD WASHINGTON ALEXANDER, vice-president of the Poole Engineering & Machinery Co., of Baltimore, died in a Baltimore hospital on June 19 from pneumonia. Mr. Alexander was 55 years of age.

DAVID EVANS EASON, superintending engineer of the Trent Canal, died at Peterboro, Ont., on June 23, at the age of 61 years. Mr. Eason was a graduate of the University of Toronto and 28 years ago began his engineering career with the Trent Canal. He was appointed superintending engineer eleven years ago, succeeding Alex Grant, now engineer-in-charge at the Welland Canal.

AUGUST E. CHRISTHILF, 57 years old, formerly chief engineer of Baltimore, died suddenly on June 26. At the time of his death he was connected with the firm of H. E. Crook & Co., Baltimore. Mr. Christhilf served two terms as chief engineer to the commissioners for opening streets and then was appointed highways engineer. In 1922 he became chief engineer. Previously Mr. Christhilf had been in the paving business, associated with the F. E. Schneider Paving Co. and the Baltimore Asphalt Block & Tile Co. He also had served as roads engineer for Fulton County, Ga.

CHARLES WELLMAN PARKS, rear admiral, Civil Engineer Corps, United States Navy, retired, died in the naval hospital in Washington on June 25. Admiral Parks was graduated from the Rensselaer Polytechnic Institute in 1884 and received a commission in the navy in 1897. He served in the navy yards in New York, Boston and Portsmouth and in the naval stations at San Juan and Hawaii. He was head of the department of yards and docks, naval station, Hawaii, from 1908 to 1910 and was public works officer at the navy yard, Philadelphia, from 1912 to 1914. He was appointed chief of the bureau of yards and docks of the navy in 1918 and served until 1921, when he retired from active service.

Construction Equipment and Materials

Meeting Called to Consider Steel Joist Standards

Representatives of all interests in the steel joist industry will meet in general conference under the auspices of the division of simplified practice, U. S. Department of Commerce, at Cleveland, Ohio, on July 15, to discuss a tentative simplified practice recommendation covering the sizes of and allowable loads for steel joists.

In the past much confusion has arisen in the design of this product because joists made by the different manufacturers varied notably in capacity. Designers, therefore, could not completely specify this type of construction without naming the product of some particular manufacturer. The tentative tables are expected to eliminate this difficulty.

New Developments

Simplified Control Features Improved Road Maintainer

One hand wheel, operating through a set of three transmission gears, now accomplishes the work formerly done by three hand wheels in adjusting the blades on the Adams one-man road maintainer model 61, manufactured by the J. D. Adams Co., Indianapolis, Ind. The hand-wheel control, located immediately back of the tractor seat, handles all blade adjustments and is readily shifted to any one of three positions. When pulled forward, it controls the front end of the blade structure; pushed to the rear, it raises and lowers the rear end of the machine; in the center position, the one control handles all blades at the same time. Heavy lift springs make the raising of the blades an easy operation.

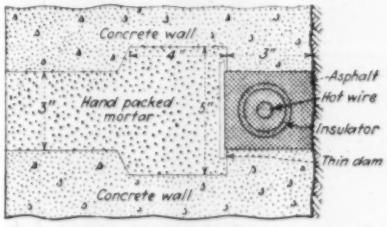
In blade structure, the new machine is similar to the former model 6, described in *Engineering News-Record*, Nov. 24, 1927, p. 857. Seven blades are used totaling 40 ft. in length. These cut all in one plane, leveling off the high spots and filling in the depressions. The effective cutting weight of the machine is 3,850 lb. It can be obtained either with or without front truck, and an independently operated scarifier for loosening up the hard high spots can be had as optional equipment. Although the normal cutting width is 9 ft., blade extensions may be added to either side, increasing the cutting width to 12 ft.

SMOOTHING ROAD WITH ONE-MAN MAINTAINER

Embedded Resistance Wire Heats Asphalt Expansion Joint

Supplementing its asphalt grouted expansion joint for dams, which is open at the top and in which a standard electrically heated grout pipe is installed, the American Asphalt Grouting Co., Chattanooga, Tenn., has developed a new joint seal which, with slight modifications, is suitable for practically universal use in sealing joints between abutting blocks of concrete, such as building foundation walls or floors, tunnel or shaft linings and subways.

The new joint seal consists of an especially designed recess left between the adjacent blocks of concrete. After the forms are removed and the recess cleaned out, a resistance wire is installed, using occasional insulators for support. Then



SECTION OF ELECTRICALLY HEATED JOINT

a thin dam of sheet iron, wood, pressboard or similar material is installed in convenient lengths and the outer portion of the slot closed with hand-placed mortar. The ends of the wire are brought out at convenient terminals through short pipes. After the mortar has set, the resistance wire is heated by an electric current and hot asphalt is pumped under pressure along the hot wire, completely filling and sealing the recess. The length is not important; several hundred feet can be grouted, if necessary, to any desired pressure.

The asphalt used is a rather soft grade especially selected, so that as the joint opens under cold conditions, water pressure from the outside will deform the asphalt and maintain the seal. The resistance wire remains protected from deterioration by the asphalt so that at any future time it may be reheated and pressure again applied to the entire joint.

Self-Feeding Device Improved on Bucket Loader

On the 1930 model Grizzly bucket loader recently announced by the Link-Belt Co., Chicago, Ill., a new type of self-feeder is used of the continuous

SELF-FEEDING DEVICE LOADING CRUSHED STONE

helical ribbon type, which serves to cut, dig and convey material to the elevator buckets in a continuous uniform stream without blow or shocks. Adjustment of the feeder is controlled by a hand wheel within easy reach of the operator, who rides with the machine on a side platform. The action of the spiral is self-sharpening, maintaining a correct cutting edge. Another feature of the machine, which has a rated capacity of 1¼ cu.yd. per minute, is the large size of the crawlers, which are mounted on a frame consisting of a one-piece steel casting. Power is provided either by a 30-hp. Buda gasoline engine or by a 20-hp. electric motor.

Oil Coating Used on Aggregate in New Type of Pavement

Studies of low-cost paving methods made by the Warren Bros. Co., Boston, Mass., have resulted in the development of a new type of asphalt macadam pavement which has been christened Penolithic. This makes use of a coating of non-volatile, free-flowing oil on the surface of the stone aggregate which has the effect of giving a more perfect bond between the asphalt and the stone, nullifying the effect of the dust film unavoidable in commercial stone and permitting the use of asphalt of harder penetration than is ordinarily used.

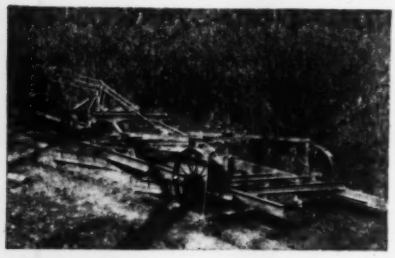
In laying Penolithic, a layer of crushed stone is spread over the prepared base. This is thoroughly compacted with a 10-ton three-wheel roller

and the non-volatile oil is pressure-sprayed over the layer. Hot pure asphalt is then applied to the oil-coated coarse stone layer, after which oiled key stone is spread over the surface and rolled. Then follows the application of the seal coat and the spreading of cover stone over the roadway. After final rolling, the surface is ready for traffic. Advantages claimed for the new pavement include durability, low cost, minimum interference with traffic, pleasing appearance and the production of a resilient, shock-absorbing, non-skid waterproof surface.

Road Maintenance Simplified by Two New Machines

Proper maintenance of roads, airports and other surfaces is the function for which the Caterpillar Tractor Co., San Leandro, Calif., has created two grading machines known as the planer and the trailer patrol. These are operated with Caterpillar 20 or 15 tractors, respectively, and are so arranged as to require only one man, who has complete control over both tractor and grader. Both are mounted on four wheels to secure steadiness of operation.

The planer is equipped with seven blades which shave off bumps and washboards and spread the surface material back and forth to fill depressions, leaving a smooth road. Material is distributed from a featheredge thickness at the shoulder to a maximum at the center of the road. Or, if desired, the blades



SEVEN BLADES USED ON ROAD PLANER

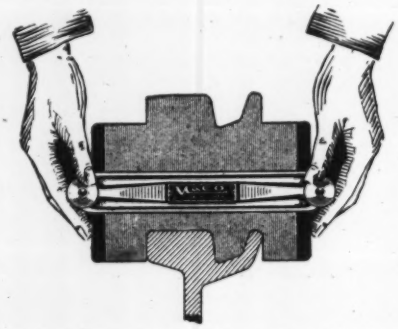
can be set to spread the material to a uniform thickness over the entire width. A maximum cut of 11 ft. can be made. Control is by means of a single hand wheel. The machine, which weighs 4,115 lb., has a main frame of 6-in. ship channels assembled by welding.

The trailer patrol, a somewhat lighter unit weighing 3,900 lb., carries a single scraper blade 12 ft. wide. This is adjusted by means of a screw lift with single hand wheel control, and is provided with an auxiliary spring lift so that the blade can easily be raised. The rear axle is equipped with a lateral shift. When desired, a scarifier may be mounted on the machine.

TRAILER PATROL CONTROLLED FROM TRACTOR

Templet Takes Accurate Profile of Irregular Objects

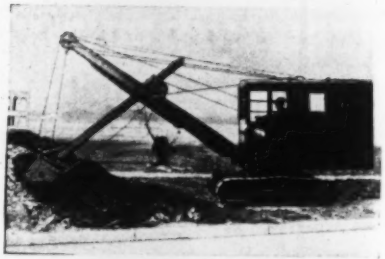
Many problems in both field and drafting room can be solved by the use of the Maco adjustable templet, an English invention being distributed in the country by the American Maco Template Co., 44 Whitehall St., New York City. This consists of a frame carrying a number of fine brass strips with a thickness of 0.007 in., which are held in position by clamps secured by two thumbscrews and springs. By loosening these thumbscrews and pressing the templet against any irregular object, such as a rail, car wheel or molding, an accurate profile of the object is secured which can be retained for any length of time by tightening the clamp. From the templet thus produced, more permanent templets can be made, or a record of the section of the profile can be traced by means of a special recorder frame which fits the instrument.



TAKING PROFILE OF RAIL WITH ADJUSTABLE TEMPLET

Light Excavator Built for Speed

Unusual design features of a new gasoline shovel, model 512, announced by the Universal Power Shovel Co. division of the Unit Corporation of America, Milwaukee, Wis., include ease of control, the free use of anti-friction bearings and a one-piece gear case which incloses all operating mechanism in a bath of oil. The latter feature reduces necessary maintenance by eliminating the necessity for oiling and greasing scattered parts of the mechanism. Repair costs are also lowered by the use of a disk clutch so constructed that it can be adjusted at a single point without the need of a wrench. The drop-forged, double heat-treated gears are mounted directly on ball bearings in a one-piece transmission case so that misalignment is impossible. As a further precaution, this transmission



GASOLINE SHOVEL

case and the power plant, a Waukesha 48-hp. motor operating at 1,400 r.p.m. are both mounted on a one-piece turntable to form an integral unit. All control levers are placed within easy reach of the operator's seat. Motor equipment includes air cleaner, magneto ignition and a pusher type fan which also ventilates the cab. A muffler is provided which discharges at the top of the machine. An independent rope crowding mechanism is used which is capable of shaking the bucket violently to dislodge sticky material, and which is so designed that the weight of the boom acts as a shock absorber to relieve gears and cable of excessive strain. The machine is easily converted to clamshell, dragline, trench hoe, crane or backfiller.

Batcher Proportions Aggregates for Small Jobs

Concrete for foundations, small bridges and culverts, and curb and gutter work, where the job does not justify setting up a complete bin and batching unit, can now be proportioned accurately by means of the Bantam Weigh Batcher, designed by the C. S. Johnson Co., Champaign, Ill. This is a simple unit, without springs, which weighs but 280 lb. and is mounted on wheels for ease in moving. It has a capacity of 4 cu.ft., or 400 lb., a full wheelbarrow load. The hopper is round and free from obstructions, discharging through a simple sliding gate. Scale parts are entirely of bronze to eliminate rust. A beam balance indicator, which may be read from either side, warns the operator when the contents of the hopper are approaching the weight set on the beam.

WHEELBARROW-SIZE WEIGHT BATCHER

The Business Side of Construction

Public Construction Gains 12 Per Cent in First Half Year

ALL CONSTRUCTION in the first half year for the whole United States is estimated at $3,300,000,000, compared with $4,500,000,000 in 1929 and 1928, according to *Engineering News-Record*. Residential building and engineering construction, normally about two-thirds of total construction, are both well below last year's level; residential volume is only half what it was last year, when it was below normal; engineering construction is 17 per cent below.

Fig. 2 on the next page shows the trends of both residential building and engineering construction in the last six years, and the cost of banking and commercial money during this period. While interest rates have dropped sharply since the high of October, 1929, it was only with April that they went below the 1925-27 average. The average for May was 3.73 and the current quotation is 3 per cent.

Engineering construction volume, though 17 per cent below that of 1929, is 4 per cent above 1928. The drop is due entirely to the falling off in private building operations, amounting to 48 per cent in the case of commercial and 35 per cent in industrial. The public buildings figure is exactly the same as that of 1929, and, moreover, whereas commercial buildings are 30 per cent *below 1928*, public buildings are 50 per cent above the value of two years ago.

Fig. 1 shows the weekly rate of contract letting in the first halves of the three years 1928-30. The average week of each half year was 68, 86, and 71 millions.

Public construction continues ahead of both 1929 and 1928, by 13 and 10 per cent. In millions of dollars, waterworks contracts totaled 26 in 1930 and 24 in 1929, sewers 40 and 45, bridges 62 and 70, federal government 52 and 51, public buildings 163 and 163. Streets and roads totaled 314 millions, compared with 257 in 1929 and 333 in 1928.

All sections of the country show increases in public works construction from last year, except the Middle West, which is exactly the same. In percentages these increases are: New England, 12; Middle Atlantic, 18; Mississippi to mountains, 10; Far West and South, 14. Public utility contracts reported by *Engineering News-Record* for the half year totaled 329 million dollars.

June lettings maintained the satisfactory rate of the last four months. The

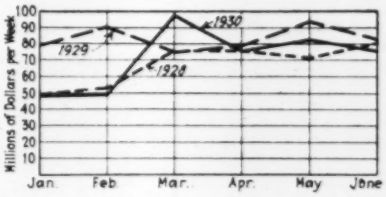
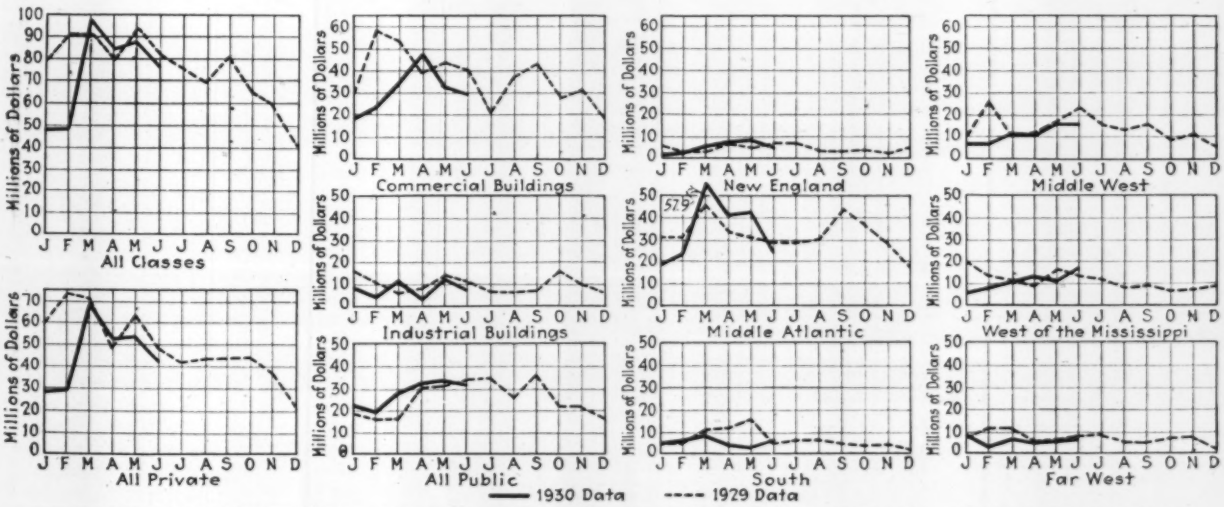


FIG. 1—AVERAGE WEEKLY CONTRACT RATE PER MONTH

VALUE OF CONTRACTS AWARDED IN THE UNITED STATES AND TOTAL FOR CANADA, JUNE, 1930

Thousands of Dollars (000 omitted)

	New England	Middle Atlantic	South	Middle West	West of Mississippi	Far West	United States June, 1930	United States Jan. 1–July 1 1930	United States Jan. 1–July 1 1929	Canada, June, 1930
Water-works	$39	$1,207	$75	$1,273	$713	$136	$3,443	$25,791	$23,559	$43
Sewers	319	2,720	187	1,330	868	373	5,797	40,278	45,011	268
Bridges, private	25	300	.....	575	.....	.....	900	6,322	28,223	.....
Bridges, public	269	1,002	125	2,099	2,641	1,324	7,460	55,319	42,065	305
Excavations	40	25	167	432	1,585	344	2,593	10,944	18,242	909
Streets and roads	2,158	18,212	20,810	12,722	10,082	6,823	70,807	313,767	256,866	2,733
Industrial buildings	2,228	10,995	1,113	4,117	7,171	3,795	29,419	200,482	310,776	600
Commercial buildings	5,928	50,026	2,850	12,360	9,125	9,305	89,594	605,965	984,018	3,325
Public buildings	3,508	9,800	350	11,484	1,494	2,203	28,839	163,289	163,002	907
Federal government	125	691	2,307	1,415	2,130	982	7,650	52,383	51,038	.....
Unclassified, private	305	716	2,500	13,023	34,180	.....	50,724	305,599	263,247	1,390
Unclassified, public	697	2,305	435	193	907	417	4,954	70,684	53,878	2,838
Total private	8,486	62,037	6,463	30,075	50,476	13,100	170,637	1,118,368	1,584,514	5,315
Total public	7,155	35,962	24,456	30,948	20,420	12,602	131,543	732,455	655,411	8,003
June, 1930, 4 weeks	15,641	97,999	30,919	61,023	70,896	25,702	302,180	.....	.....	13,318
May, 1930, 5 weeks	44,043	193,732	16,939	78,025	52,194	32,164	417,097	.....	.....	16,712
June, 1929, 4 weeks	24,144	111,274	18,409	99,034	47,988	29,316	330,165	.....	.....	22,024
Jan. 1–July 1, 1930	121,024	852,364	143,718	289,169	277,093	167,455	.....	1,850,823	.....	87,111
Jan. 1–July 1, 1929	126,762	875,325	216,993	438,850	362,077	219,918	.....	.....	2,239,925	94,298



CONTRACTS AWARDED—AVERAGE WEEK PER MONTH—TOTAL U. S. BY CLASSES—ALL CLASSES BY SECTIONS

figure is 302 millions, compared with 330 in 1929 and 323 in 1928. Had lettings in the first two months averaged those of the succeeding four, the total would have been 2,120 millions, or only 5 per cent below last year's record volume.

The depression in residential building is largely the result of overdevelopment in the real estate field. Some authorities believe that the seasonal increase this year marks an upturn and that a larger volume will be recorded in the second half, particularly in the last quarter. Should this happen the outlook for building generally will be considerably improved.

Financing — Net corporation capital issued in the first five months totaled 2,676 millions, compared with 2,684 millions last year. Each of the first three months was well below 1929, but April exceeded a year ago by 26 per cent, and May by 39 per cent. Construction follows new capital by an average of four months. The strongest items are railroads, public utilities and oil, all far above last year. The weakest items are manufacturing, and land and buildings.

Municipal bonds total 587 millions long-term and 312 short-term, compared with 538 and 407 millions in the five months of 1929.

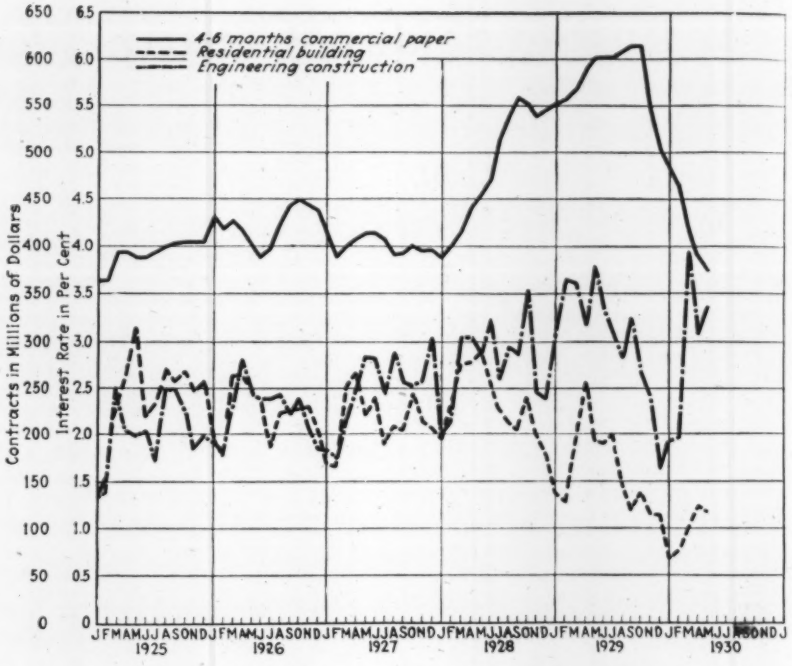


FIG. 2—TRENDS OF MONEY COST AND CONSTRUCTION VOLUME

Materials Prices Dropping

With such staple commodities as cotton, lead, rubber, silk, sugar, wheat and zinc at record low prices, it is natural to expect important price recessions in building materials. These have been trending downward since the beginning of the year.

This downward movement was seen first among secondary items, as lath and roofing. Structural steel weakened in February. In order, recessions took place as follows: in April, brick, road oils, reinforcing bars, railway ties; in May, wrought-steel pipe, fir; in June, pine lumber; now it is sewer pipe, lime, concrete blocks, and another drop in steel.

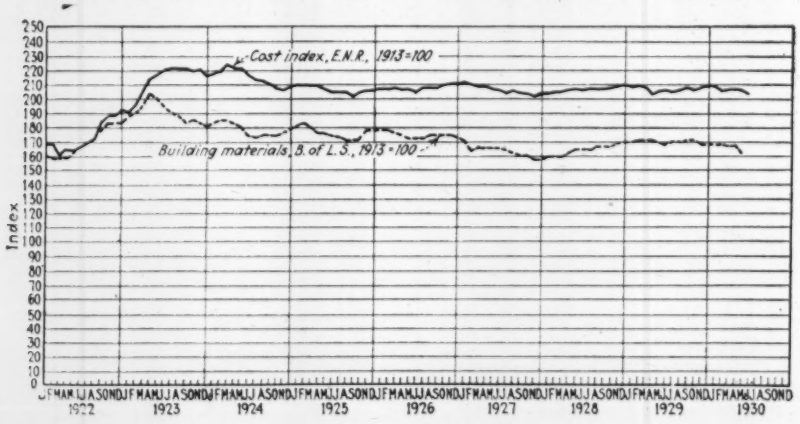
During June price cuts were varied and numerous. Some of the principal reductions and where they occurred were: sewer pipe, 1½c. per foot at New York; fir railway ties, 7c. San Francisco; roofing slate, 39 @ 45c. per square at Pennsylvania quarries; crushed slag, 5c. per ton Youngstown; concrete blocks, 4c. Minneapolis and 1c. St. Louis; steel shapes, 5c. Pittsburgh; brick 50c. Boston and St. Louis; hydrated common lime, $1 per ton New York. The drop in this grade of lime is the first in more than a year. Canada, on the other hand, reports a trade pick-up in lime and gypsum products. Lumber declines, ranging from $1 to $2, and affecting nearly all grades, occurred in Kansas City, Minneapolis, St. Louis, Baltimore and Seattle. At Seattle, Douglas 3x12s are $2 below June prices, at $19@$20.

Price advances were few. Paving and other classes of public construction took considerable crushed stone, inducing a rise of 25c. per cubic yard at New York, even though railway requirements for track ballast slumped badly. Gravel price also rose 25c. Prices of tar and asphalt roofing increased 40c. per 100 lb. New York; strip shingles followed by $1 per square.

The lumber industry, comparing yard-stock piles with unfilled orders, sees lower prices. A reduction in cutting to 39 per cent below normal has not checked the decline.

Cement dealers hold to June price levels in most cities. An Indiana cement company says it will be forced to close its mill unless the state patronizes it for public works. Although this mill's prices are as low as those quoted outside the state for local delivery in Indiana, contractors look for a larger cut than the local manufacturers are prepared to make at present. Tennessee purchased 62,400 bbl. for road work from a Memphis producer at 20 to 25c. under uniform bids of eleven outside competitors. On one lot this company bid $1.82, against $2.07 by each of eleven companies; on a second, $1.85, against $2.05.

The steel industry reveals few bright spots. The brightest continues to be the pipe-line demand. There is also some buying of tank plates for storage of oil, gas and gasoline.

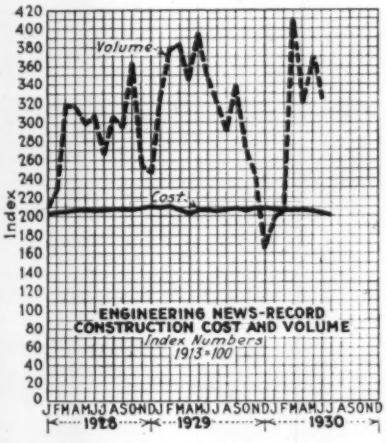


Says a Builder

In my judgment, says H. C. Turner, president of the Turner Construction Co., we have reached a low point in the cost of buildings and the man with confidence in the future of this country will build now and at better prices than are likely to prevail again for some time to come. The cost of building construction remained fairly constant from 1923 to 1929. Increases in wages were offset by better management. Today building materials can be purchased at depression prices. You can judge how long this will continue. Wages have not been reduced, but efficiency has decidedly increased. With the surplus of skilled

Construction Cost and Volume Index Numbers

Costs are down 1.2 per cent from a month ago, due to lower materials prices. The principal decreases were 5c. in steel shapes and $1.50 in lumber. The Volume Index is 324, or 6.5 less than for June, 1929.


Volume
Cost
Index
ENGINEERING NEWS-RECORD
CONSTRUCTION COST AND VOLUME
Index Numbers
1913=100
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1928
1929
1930

E. N.-R. Cost		E. N.-R. Volume*	
July, 1930	**200.95**	**June, 1930**	**324**
June, 1930	203.36	May, 1930	354
July, 1929	204.77	June, 1929	347
Peak, June, 1930	273.80	1929 (average)	317
1929 (average)	207.02	1928 (average)	287
1913 (average)	100.00		
1929		1929	
January	209.40	January	325
February	210.40	February	378
March	207.78	March	382
April	203.40	April	332
May	205.15	May	395
June	205.65	June	347
July	204.77	July	320
August	205.91	August	290
September	207.57	September	340
October	206.32	October	273
November	208.46	November	245
December	209.46	December	166
1930		1930	
January	208.96	January	199
February	206.46	February	204
March	206.80	March	408
April	207.12	April	†320
May	205.86	May	354
June	203.36	June	324

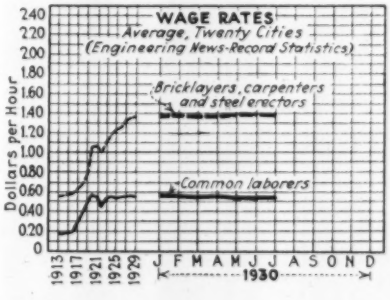
*Corrected for price change since 1913.
†Revised.

workmen, the most capable and skilled are employed with the obvious increase in performance and the constant reduction in labor cost.

Unemployment

The nationwide employment slump may soon be further depressed by the regular Fourth of July shutdown in the lumber mills and logging camps, midsummer lag in steel making, inventory taking, and other purely seasonal curtailments. Reductions are going into effect in railway shops and maintenance-of-way forces of the Santa Fe and by those railroads having plants in the Birmingham district; these are retrenchment measures.

Union unemployment is the same as in May. In the building trades, the A. F. of L. figure was 37 per cent unemployed in May and June, compared with 19 per cent in June, 1929.



CURRENT BUILDING AND CONSTRUCTION TRADES WAGE RATES PER HOUR

Advances since last month are indicated by **heavy type**, declines by *italics*

Cities	Bricklayers	Carpenters	Hoisting Engineers	Hod Carriers	Pile Drivers	Structural Iron Workers	Common Labor*
Atlanta	$1.25@1.40	$0.60@.70	$0.60@1.00	$0.50	.....	$0.75@1.25	$0.25@.35
Baltimore	1.75	1.00@1.10	1.00@1.37½	1.00	$0.65	1.00@1.25	.35
Birmingham	1.50	1.00	1.25	.50	.....	1.25	.20@.35
Boston	1.50	1.37½	1.37½	.85	1.27½	1.37½	.45@.80
Cincinnati	1.62½	1.40	1.40	1.00	1.40	1.40	.40@.60
Chicago	1.70	1.62½	1.62½	.97½	1.62½	1.62½	.97½
Cleveland	1.62½	1.37½	1.37½	.87½	1.10	1.50	.40@.87½
Dallas	1.62½	1.12½	1.25	.35 @ .75	1.25	1.25	.35@.50
Denver	1.50@1.62½	1.25	1.25@1.37½	.87½@1.00	.....	1.25	.62½
Detroit	1.56½	1.00@1.25	1.00@1.10	.90	1.00@1.10	1.00@1.25	.50@.60
Kansas City	1.50	1.25@1.37½	1.25	.90	**1.37½**	1.37½	*.25*@.75
Los Angeles	1.37½	1.00	1.00	.75	.87½	*1.00*	.37½@.50
Minneapolis	1.30	.90	.90@1.00	.80	.....	1.00@1.25	**.50@.65**
Montreal	1.25	.80	.75	.....	.90	1.00	.30@.35
New Orleans	1.50	.90	1.25	.75	.80@1.00	1.25	.30@.40
New York	1.87½	1.65	1.92½	1.18¾	1.10@1.23½	1.92½	1.03½
Philadelphia	1.75	1.50	1.02½	.70@1.12½	1.00	1.37½@1.50	.40@.50
Pittsburgh	1.75	1.50	1.43¾@1.56¼	1.12½	.....	1.50	.40@.80
St. Louis	1.75	1.50	1.60@1.75	1.15@1.25	**1.50**	*1.62½*	*.40*@.87½
San Francisco	1.37½	1.12½	1.12½	.87½	1.12½	1.37½	.68¾
Seattle	1.50	1.12½	1.12½@1.25	1.00	1.12½	1.25	.70

*Minimum rates are non-union and for construction other than buildings.

Stock Prices of Equipment Companies and the Railroads

The accompanying tabulation lists capital stocks of 54 companies, mostly manufacturers, connected with the construction industry. Of the five columns of quotations, the first may be regarded as "normal." Thus the average normal price, in the first nine months of 1929, was 64. The lowest average in 1930 was 35, which is practically the same as that registered in the crash period. June was low for 41 of these stocks. The 1930 high thus far was 72.5, and the top quotations of 42 of the stocks were made in March and April. Few stocks have maintained prices anywhere near the top quotations, and the average on June 28 was 37.4, or 48.5 per cent below the high, 7 per cent above the low, and 41.5 below "normal."

The percentages of the number of these stocks that are at or above 1930 lows or are above or below 1929 lows, compared with representative railroad and electrical-equipment stocks are as follows:

Per Cent of Total Number in Each List	Constr. Products	Rail-roads	Elec. Equipment
At 1930 lows	76	78	75
Above 1930 lows	24	22	25
Below 1929 lows	49	65	37½
Above 1929 lows	51*	35	62½

*At or above 1929 lows.

	Av. High and Low 1st 9 Mos. 1929	Low Oct.-Dec., 1929	Low 1930	High, 1930	Closing Bid June 28, 1930
Alpha Portland Cement	42½	23	24	42½	25
General Asphalt	78	42½	38½	71½	41½
International Cement	84½	48	55½	75½	59
Lehigh Portland Cement	53	30	32	42	32
Penn-Dixie Cement	17½	3½	6¼	12	8½
Warner Bros., new	46	38½	40¼	64½	43
Amer. Encaustic Tiling	35½	18¼	15	30¼	16
Amer. Rad. & Stan. San.	47½	28	23¼	39½	25
Amer. Seating, U.T.C.	36	17	10	26½	10
Celotex	65½	31	10¼	60	11½
Certain-teed Products	24½	10½	5¼	15½	5½
Devoe & Reynolds	54½	24	22	42½	22½
Foundation	52½	12½	11	28½	11½
Holland Furnace	43	21	26½	41¼	33½
Illinois Buick	33½	23	19½	27	20½
Johns-Manville	197½	90	73½	148½	75
Libby-Owens-Ford Glass	....	17	19½	31½	20
Long Bell Lumber	25½	12	8	15½	9½
Mnpls-Honeywell Reg.	87½	59	55½	76½	55½
National Radiator	11	1½	1½	4½	1½
Otis Elevator	....	48½	55	80½	59½
Sherwin-Williams	93½	75	80	85	82½
Standard Plate Glass	6½	1½	¾	3	1¾
Starrett	35½	13	27½	47½	31½
Thompson-Starrett	17½	5	9	18½	9¼
U. S. Gypsum	73½	36½	36½	58	38
Universal Pipe & Rad.	14½	2½	2½	9	4
Walworth	35½	22	21½	42½	23½
Yale & Towne Mfg.	74½	61½	41½	77	42
Amer. Rolling Mill	125½	60	51½	100½	53½
Bethlehem Steel	111½	78½	75½	110½	79½
Br. Empire St.	5	1½	1½	4	1½
A. M. Byers	156½	50	66½	112½	70½
A. M. Castle	72½	42	35	71	43½
Centrifugal Pipe	10	4½	4½	8½	6½
Colorado Fuel & Iron	67½	27½	36½	77	45½
Crucible St. Co. of Am.	103½	69	70½	93½	75
Follansbee Bros.	70	32½	25	50½	26½
Gulf States Steel	67½	42	38	80	38
Inland Steel	95½	71	68	98	68
Interlake Iron	....	20	15½	28½	18½
Keystone St. & Wire	47½	18	12½	22	12½
Ludlum Steel	87½	22	22	44½	24½
McKeesport Tin Plate	72½	54	61	89½	72½
National Steel	....	50	50	76½	55½
Newton Steel	103	35	28	58	29½
Otis Steel	44½	22½	25	38½	25
Sloss-Sheffield St. & Ir.	86½	21	24½	56½	25½
Superior Steel	53½	15	12½	29½	16½
Truscon Steel	53½	28½	25	37½	26½
U. S. Pipe & Fdy.	....	12	18½	38½	27
U. S. Steel	212½	150	151½	198½	156
Vulcan Detinning	100	38	60	156	64
Warren Fdy & Pipe	24½	15½	23½	43½	27
Youngstown Sh. & Tube	140	87½	108	152	115

Current Prices of Construction Materials

Price advances since last month are indicated by **heavy type**; declines by *italics*

Building Materials

PORTLAND CEMENT—Prices per barrel, *without charge for bags*, cash discount not deducted. Prices marked f.o.b. are manufacturers'; others are delivered by truck to contractors:

	July 3, 1930	One Mo. Ago	One Yr. Ago
Atlanta	$2.49	$2.34	$2.10
Baltimore	2.60	2.60	2.65
Birmingham	2.60	2.60	2.60
Boston	2.50	2.50	2.25@2.35
Dallas	2.15	2.15	2.15
Denver	2.61	2.61	2.55
Jersey City	2.60	2.60	2.25
Kansas City	*2.40*	2.65	2.55
Los Angeles	1.92	1.92	2.76
Montreal	2.20	2.20	....
New Orleans	2.65	2.65	2.65
New York	*2.10*	2.15@2.20	2.25
Philadelphia	2.10	2.10	2.40
St. Louis	2.45	2.45	2.45
San Francisco	2.64	2.64	2.41
Seattle	2.70	2.70	2.70
(F.O.B.)			
Cedar Rapids	2.23	2.23	2.24
Chicago	1.95	1.95	2.05
Cincinnati	2.14	2.14	2.17
Cleveland	2.04	2.04	2.14
Davenport	2.14	2.14	2.24
Detroit	1.95	1.95	1.95
Duluth	2.04	2.04	2.04
Indianapolis	1.99	1.99	2.09
Milwaukee	2.10	2.10	2.20
Minneapolis	2.27	2.27	2.22
Peoria	2.12	2.12	2.22
Pittsburgh	1.95	1.95	2.05
St. Paul	2.27	2.27	2.22
Toledo	2.20	2.20	2.20

Current mill-prices per barrel, in carloads, without bags, f.o.b.:

Alpena, Mich	$1.65	Northampton, Pa	$1.75
Buffington, Ind	1.70	Limedale, Ind	1.70
Chnchfield, Ga	1.95	Mason City, Ia	1.85
Hannibal, Mo	1.80	Norfolk, Va	1.90
Houston, Tex	1.95	North Birmingham, Ala	1.70
Hudson, N. Y	1.85	Richard City, Tenn	2.05
Ironton, Ohio	1.75	Steelton, Minn	1.85
Iola, Kan	1.85	Universal, Pa	1.70
La Salle, Ill	1.80	Wyandotte, Mich	1.70

SAND AND GRAVEL—Per ton, delivered by dealers. Weight of sand per cu.yd., 1½ tons; gravel, 1½ tons, unless otherwise specified in pounds:

	Gravel		Sand
	1½ In.	¾ In.	
Atlanta	$2.60	$2.60	$2.15
Baltimore, per cu.yd	2.40	2.60	1.70
Birmingham, per cu.yd., 2,600 lb	3.50	3.50	3.00
Boston	1.90	1.90	1.25
Chicago, per cu.yd	1.90	1.90	1.80
Cincinnati	1.75	1.75	1.50
Cleveland, per cu.yd., 3,000 lb	2.70	2.70	2.50
Dallas, per cu.yd., 2,700 lb	2.60	2.60	2.00
Denver, per cu.yd., 2,700 lb	1.95	1.95	1.35
Detroit	2.50	1.85	1.65
Los Angeles	1.40	1.40	1.00
Minneapolis, per cu.yd., 2,800 lb	2.40	2.40	1.10
Montreal	1.25	1.25	1.25
New Orleans, per cu.yd., 2,700 lb	3.75	3.75	2.75
New York, per cu.yd	**3.40**	**3.40**	2.15
Philadelphia	2.30@3.15	2.30@3.15	1.50@2.31
Pittsburgh	**3.45@2.40**	**1.45@2.40**	**1.65@2.60**
St. Louis	*1.55@1.90*	*1.55*	*1.65*
San Francisco	1.75	1.75	1.75
Seattle, per cu.yd., 3,200 lb	1.75	1.75	1.75

Note: New York gravel weighs 2,800@3,000 lb. and sand, 2,700 lb. per cu.yd.

CRUSHED STONE—Per ton, delivered by dealers. Weight per cu.yd., 1½ tons, unless otherwise specified in pounds:

	1½ In.	¾ In.
Atlanta	$2.60	$2.60
Baltimore, per cu.yd	2.75	2.85
Birmingham, Limestone, per cu.yd	3.00	3.25
Boston	2.10	2.10
Chicago, Limestone, per cu.yd., 2,500 lb	1.90	1.90
Cincinnati	2.25	2.25
Cleveland	2.70	2.70
Dallas, per cu.yd., 2,500 lb	3.25	3.40
Denver, Granite, per cu.yd., 2,700 lb	2.50	2.50
Detroit, Limestone	2.25	2.25
Los Angeles	1.50	1.50
Minneapolis, Limestone, per cu.yd., 2,600 lb	2.40	2.40
Montreal	1.90	2.10
New York, Limestone, per cu.yd	**3.40**	**3.40**
Philadelphia, Limestone	2.30@3.15	2.30@3.15
Pittsburgh	2.75	2.75
St. Louis	*1.55*	*1.55*
San Francisco, Trap rock	1.65	1.65
Seattle, per cu.yd., 2,700 lb	1.90	1.90

CRUSHED SLAG—Manufacturers' quotation on crushed slag in carloads, per net ton, at plant:

	1½-In.	¾-In.	Roofing	Sand
Birmingham, Ala	$0.90	$1.15	$2.05	$0.55
Buffalo District	1.25	1.35	2.25	1.25
Cleveland, Ohio	1.35	1.35		.80
Western Pennsylvania	1.25	1.25	**2.00**	1.25
Toledo, Ohio	1.25	1.25	1.50	1.25
Youngstown District	*1.25*	*1.35*	**2.00**	*1.25*

HOLLOW TILE—Building tile per block, delivered by dealers to contractors in lots of 2,000 pieces or over:

	4x12x12	6x12x12	8x12x12	10x12x12	12x12x12
Atlanta	$0.069	$0.091	$0.125	*$0.137*	$0.178
Baltimore	.105	.....	.20	.....	.26
Birmingham	.09	.127	.174	.218	.261
Boston	*.08*	.113	.155	.21	.26
Chicago	**.076**	.104	.142	.182	.202
Cincinnati	.06815	.09485	.129	.165	.184
Cleveland	.064	.088	.128	.171	.19
Dallas	*.085*	**.124**	**.154**	.251	.296
Denver	.0975	.135	.175	.2125	.25
Detroit	.098	.135	.184	.24	.265
Kansas City	.0525	.077	.184	.24	.265
Los Angeles	.085	.122	.175	.232	.285
Minneapolis	.0611	.081	.10605	.1302	.1737
Montreal	.12*	.....	.22†	.....	.....
New Orleans	.086	.118	.16	.212	.256
New York	.0864	.1296	.162	.....	.....
Perth Amboy, N. J.(f.o.b.)	.....	.....	.....	.2388	.2956
Philadelphia	.105	.14	.215	.28	.34
Pittsburgh	.068	.....	.1175	.....	.1726
St. Louis	.078	.104	.145	.175	.21
San Francisco	.108	.156	.255	.....	.....
Seattle	.085	.115	.18	.....	.....

*4x4x12. †8x8x12.

BRICK—Prices delivered by dealers per thousand, are as follows:

		Paving F.O.B.	
	Common	3x8½x4-In.	3½x8½x4-In.
Atlanta	$12.00	$36.00*	$42.00†
Baltimore	13.00	40.00	46.00
Birmingham	14.00	26.00*	31.00†
Boston	*16.00*	43.00	47.00
Chicago	12.00	42.00	45.00
Cincinnati	17.50	37.00	39.00
Cleveland	14@16	33.00	36.00
Dallas	13.50	*29.00**	.....
Denver	11.00	.....	.....
Detroit	15.50	33.50	36.50
Kansas City	14.00	.....	.....
Los Angeles	**11.00**	.....	.....
Minneapolis	12.75	.....	.....
Montreal	20.00	.....	.....
New Orleans	16.50	38.00*	45.00
New York	13.00	45.00	50.00
Philadelphia	16.00	40.00	46.00
Pittsburgh	16.00	40.50	45.00
St. Louis	*13.00*	40.00	40.00
San Francisco	14.50	45.00*	
Seattle	14.00	50.00	55.00

*2½x8½x4 in. †3x8½x4.

LIME—Prices delivered by dealers to job:

	Hydrated, per Ton		Lump, per Barrel	
	Finishing	Common	Finishing	Common
Atlanta	$21.00	$13.50	.....	.....
Baltimore	22.00	14.00	$2.55†	.....
Birmingham	22.00	16.00	3.00†	$2.00†
Boston	22.00	15.00	4.00*	3.15*
Chicago	17.00	14.50	15.00‡	15.00‡
Cincinnati	15.80	13.00	.....	.....
Cleveland	18.00	15.00	2.50†	2.50†
Dallas	20.00	.....	.....	18.00‡
Denver	32.00	23.75	3.80*	3.00*
Detroit	18.00	14.80	2.20†	2.00†
Kansas City	**22.50**	**17.50**	2.85†	2.50†
Los Angeles	18.90	16.00	2.85†	14.00‡
Minneapolis	25.50	21.00	.....	1.70†
Montreal	19.75	.....	.....	15.00‡
New Orleans	.....	.....	2.60†	1.60†
New York	21.00	*13.00*	4.10*	3.15*
Philadelphia	22.00	15.00	.....	.....
Pittsburgh	20.00	17.00	2.50†	.....
St. Louis	24.00	18.00	2.75†	15.00‡
San Francisco	20.00	20.00	2.00†	1.85†
Seattle, paper sacks	36.00	24.00	.....	2.80†

*Per 280-lb. bbl. (net). †Per 180-lb. (net). ‡Per ton.

CONCRETE BLOCKS—Manufacturers' quotations on standard, 8x8x16-in., hollow, delivered to job, each:

Boston	$0.18@$0.20	Minneapolis	*$0.11*
Brooklyn and Queens	.12@ .14	New Orleans	.22
Cleveland	.16@ .17	Philadelphia	.18@.25
Denver	.22	Pittsburgh	.20
Detroit	.15	St. Louis	*.17*

SLATE—Roofing, f.o.b., quarry, Bangor, Pa., net, per square:

No. 1 Clear	*$9.00@$12.60*
No. 1 Ribbon	8.10@ 9.23
Medium Clear	*8.16@ 9.45*

Road and Paving Materials

PAVING STONE—Carloads or cargo lots of granite blocks, 4x8x4-in. dressed, f.o.b.:

Atlanta	$3.00 per sq.yd.
Baltimore	3.00 per sq.yd.
Boston	135.00 per M.
Chicago, 5 in	3.25@3.90 per sq.yd.
Cincinnati	110.00 per M.
Cleveland	115@120 per M.
Detroit, 5 in	3.00 per sq.yd.
Kansas City	3.00 per sq.yd.
Minneapolis, 4½x8x5 in	2.80 per sq.yd.
Montreal	104.75 per M.
New Orleans	2.80 per sq.yd.
New York, 5 in., Grade 1, 30 blocks per sq.yd	150.00 per M.
Philadelphia	125.00 per M.
St. Louis, 4x5x8 to 12 in	3.50 per sq.yd.

Current Prices of Construction Materials

Road and Paving Materials—Continued

WOOD-BLOCK PAVING—Prices, f.o.b., in carloads:

	Size of Block	Treatment	Per Sq.Yd.
Atlanta	3½	16	$2.25
Boston	3½	16	2.25
Chicago	3½	12	2.10
Cincinnati	3½	16	2.35
Kansas City	3½	16	2.75
Minneapolis	3½	16	2.75
Montreal	4	16	4.50
New Orleans	3½	16	2.40
New York	3½	16	2.50
St. Louis	3½	16	2.40

FLAGGING—Alongside dock, New York: Manhattan and Bronx, 4 ft. wide, 24c. per sq.ft.; Queens, 5 ft. wide, 26c. per sq.ft.

CURBING—*New York*: Bluestone, f.o.b. barge, 5x16 in., rough, 90c. per lin.ft., cutting charges extra. *Birmingham*: Limestone, 5x18-in., f.o.b., $1.05 per lin.ft. *St. Louis*: Class "B" straight, 5x16-in., f.o.b., $1.00 per lin.ft.; roundings, $1.35 per lin.ft.

ASPHALT—Manufacturers' quotations per ton in packages (350-lb. bbls or 425-lb. drums); also in tank-car lots, f.o.b. points listed:

	Package	Tank-car
Atlanta (Mexican)	$20.40	$16.40
Baltimore (Standard Oil, f.o.b. refinery)	21.75	17.75
Birmingham (Mexican)	27.00	23.00
Boston (Mexican)	23.50	18.00
Chicago (Texas)	23.50	19.30
Cincinnati (Kentucky Rock)	.....	12.30
Cleveland	24.00	20.00
Dallas (Texas)	*23.75*	.....
Denver (California)	35.00	.....
Detroit (Mexican) (Texas)	19.72	14.87
Kansas City, Mo. (Texas)	*23.00*	17.50
Los Angeles ("D" Grade, Calif., f.o.b., El Segundo)	18.00	12.00
Maurer, N. J. (Bermudez)	30.00	.....
Maurer, N. J. (Trinidad)	25.00	.....
Minneapolis, (Stanolind, f.o.b., Twin Cities)	23.00	19.10
Montreal (Imperial)	28.00	21.50
New Orleans (Texas)	24.00	21.00
New York (Texas)	22.50	18.50
Philadelphia (Mexican)	18.00	15.00
Pittsburgh (Standard Oil)	24@26	14@18
St. Louis (Venezuela)	22.50	18.50
San Francisco, (f.o.b. refinery, Oleum, Calif.)	18.00	12.00
Seattle (Standard Oil)	21.40	18.00

ROAD OILS—Manufacturers' quotations, f.o.b., in tank cars, 8,000 gal. minimum, per gal.:

Birmingham, 40@50% asphalt	$0.0525
Birmingham, 50@60% asphalt	.0525
Dallas, 40@50% asphalt	.055
Dallas, 50@60% asphalt	.055
New York, 40@50% asphalt, (at terminal)	.05
New York, 50@60% asphalt, (at terminal)	.05
St. Louis, 40@50% asphalt	.04
St. Louis, 50@60% asphalt	.04

Iron and Steel

PIG IRON—Producers' quotations, per gross ton, f.o.b.:

Birmingham, No. 2 fdry., silicon 1.75@2.25	$14.00
Pittsburgh, basic, incl. freight ($1.76) from Valley	19.63@20.13

STRUCTURAL STEEL—Manufacturers' and dealers' quotations per 100 lb.

	Shapes, 3 to 15-In.	Plates, ¼-In.
Birmingham, large mill lots, f.o.b.	$2.15	$2.15
Chicago, warehouse, delivered	3.10	3.10
Cleveland, warehouse, delivered	3.00	3.00
Dallas, warehouse, delivered	*3.85*	*3.85*
New York, warehouse, delivered, up to 3,999 lb.	3.30	3.30
Pittsburgh, large mill lots, f.o.b.	*1.65*	*1.65*
St. Louis, warehouse, delivered	3.25	3.25
San Francisco, warehouse, delivered	3.40	3.40

BARS, CONCRETE REINFORCING—Manufacturers' and dealers' quotations on bars rolled from billets, per 100 lb. for ½-in.:

Birmingham, large mill lots, f.o.b.	$2.15
Chicago warehouse, delivered	2.15@3.00
Cleveland, warehouse, delivered	2.25@2.44
Dallas, warehouse, delivered	*2.90*
New York, warehouse, delivered, over 5 tons	2.70
Pittsburgh, large mill lots, stock lengths, f.o.b.	1.75
St. Louis, warehouse, delivered	3.15
San Francisco, warehouse, delivered	2.50

EXPANDED METAL LATH—Per 100 sq.yd., painted, delivered to job, in less-than-carload lots:

Lb. per Sq.Yd.	New York	Birmingham	Chicago	St. Louis	Dallas	San Francisco
2.2	$18.50	$22.00	$16.00	$18.00	$21.50	$21.50
2.5	19.50	23.00	17.00	19.00	24.00	22.50
3.0	21.00	25.00	18.50	20.50	25.50	25.00
3.4	22.00	26.50	19.50	21.50	30.00	27.00

WIRE REINFORCEMENT FOR CONCRETE—Manufacturers' quotations per 100 sq.ft. in carloads at mills; dealers, delivered', in lots of 10,000 sq.ft. or over; plain 4 in. by 4 in. mesh:

Style Number	Weight in Pounds per 100 sq.ft.	Pittsburgh Mill	Chicago District Mill	Warehouse Delivery: New York	St. Louis	Dallas	San Francisco
032	22	$0.99	$1.01	$1.39	*$1.30*	$1.13	$1.22
049	28	1.26	1.29	1.76	*1.70*	1.38	1.55
068	35	1.54	1.58	2.18	*2.10*	1.67	1.91
093	40	1.98	2.03	2.79	*2.65*	2.00	2.46
126	57	2.45	2.51	3.45	*3.30*	2.55	3.03
153	68	2.92	2.99	4.13	*4.00*	3.157	....
180	78	3.35	3.43	4.73	*4.60*	3.47	....

STEEL SHEETS—Manufacturers' and dealers' quotations per 100 lb. base:

	Blue Annealed No. 10*	Black No. 24	Galvanized No. 24
Chicago, warehouse, delivered	$3.35†	$4.05†	$4.60†
Cleveland, warehouse, delivered	3.25	3.75	4.50
New York, warehouse, delivered	*3.50@3.60†*	**3.80@4.00**	4.25@4.50
Pittsburgh, large mill lots, f.o.b.	2.00	*2.50@2.55*	*3.50*
St. Louis, warehouse, delivered	3.45	4.25	4.85
San Francisco, warehouse, delivered	3.80	4.35	5.00

*Light plates. †400 lb. to 3,999 lb.

WIRE ROPE—Discounts from manufacturers' list price on regular grades of bright and galvanized, Eastern Territory, New York, and East of Missouri River.

	Base
Cast steel round strand rope	20%
Galvanized iron rigging and guy rope (add to list)	12½%
Galvanized steel rigging and guy rope	7½%
Plow steel round strand rope	35%
Round strand iron and iron tiller	5%
"Special Steel" and extra strong cast steel, round strand rope	27½%

Discount 5 points less than discount for Eastern territory: California, Oregon, Nevada, Washington, Wyoming, New Mexico, Colorado, North Dakota, Nebraska, Kansas, Oklahoma and Texas. Discount 10 points less than discount for Eastern territory: Arizona, Montana, Idaho and Utah.

RIVETS—Manufacturers' and dealers' quotations on structural rivets, round-head, ½-in., full kegs, per 100 lb.:

Chicago, warehouse, delivered	$4.00
Dallas, warehouse, delivered	4.50
New York, warehouse, delivered	4.50*
Pittsburgh, large mill lots, f.o.b.	2.90
St. Louis, warehouse, delivered	4.15
San Francisco, warehouse, delivered	5.50
Seattle, warehouse, delivered	4.25

*This price is for full kegs; broken kegs are $6.00 per 100 lb.

STEEL SHEETPILING—The manufacturers' base price, f.o.b., Pittsburgh, for large mill lots is $2.25 per 100 lb.

TERNE PLATE—I C, 8-lb. coating, 20x28-in., f.o.b., Pittsburgh mill:

Per package	*$10.50*

SHIP SPIKES—Per 100 lb., black, from dealers' warehouse stocks; galvanized are about $1.75 per 100 lb. higher:

	½-In.	⅝-In.	¾-In.
San Francisco	$5.55	$5.10	$4.95
Seattle	7.75	5.65	5.50

Pittsburgh mill base in lots of 200 kegs or more, $3.00 per 100 lb.

WIRE NAILS—Per 100 lb. keg, base, delivered from warehouse stocks; also Pittsburgh mill base:

Pittsburgh Mill	Birmingham	Chicago	St. Louis	Dallas	San Francisco	Montreal
$2.30@$2.40	$3.30	$2.75@$2.85	$2.85	$3.75	$3.25	$4.95

SCRAP—The prices following are, f.o.b., per ton, paid by dealers:

	New York Per Gross Ton	Chicago Per Gross Ton	Detroit Per Gross Ton
No. 1 railroad wrought	$10.00@$10.50	*$11.50@$12.00*	*$10.50*
•Stove plate	*6.00@8.00*	*10.00@10.50*	*8.00*
No. 1 machinery cast	10.25	*13.00@13.50*	*10.00**
Machine shop turnings	5.50@6.00	*6.50@7.00*	*6.50*
Cast borings	6.00@9.50	*8.00@8.50*	*7.50*
Railroad malleable	10.50@11.00	*13.50@14.00*	*12.00*
Re-rolling rails	10.00	*14.50@15.00*	*12.00*
Re-laying rails, 56@60 lb.	23.00	*20.00@25.00*	**17.00**
Heavy melting steel, No. 1	*9.00@10.50*	*12.00@12.50*	*11.25*
Iron and steel pipe	*7.25@8.25*	*7.00@7.50*	.....

*Net ton.

FREIGHT RATES—Effective May 20, 1930, on finished steel products in the Pittsburgh district, including plates, structural shapes, merchant-steel bars, pipe fittings, plain and galvanized wire nails, rivets, spikes, bolts, flat sheets (except planished) chains, etc., the following freight rates in cents per 100 lb., apply on carload lots of 36,000 lb. or 18 tons:

Atlanta	$0.58	Detroit	$0.265
Baltimore	.27	Kansas City	.71†
Birmingham	.58	New Orleans	.67
Boston	.40	New York	.33
Buffalo	.235	Pacific Coast (all rail)	1.15*
Chicago	.34	Philadelphia	.29
Cincinnati	.265	St. Louis	.39
Cleveland	.185	St. Paul	.60
Denver	1.15*		

*Minimum weight on structurals, 60,000 lb. †Except iron or steel pipe and fittings.

Railway Materials and Supplies

STEEL RAILS—Manufacturers' quotations per gross ton, f.o.b., for large mill lots:

	Pittsburgh	Birmingham	Chicago
Standard openhearth rails	$43.00	$43.00	$43.00
Light rails, 25 to 45 lb.	36.00	34@36	34@36
Re-rolled rails	34.00	34@36	34@36

RAILWAY TIES—For fair-sized orders, f.o.b., the following prices per tie hold:

		6 In. x 8 In. by 8 Ft.	7 In. x 9 In. by 8½ Ft.
New York	Long-leaf sap pine, untreated	$1.05	$1.20
	Creosoted—prices on application.		
Birmingham	White oak, creosoted	1.52	1.75
	Southern pine, creosoted	1.25	1.60
Chicago	White oak, untreated	1.40	1.78
	Oak, empty cell, creosoted	1.80	2.40
	Oak, zinc treated	1.60	2.10
	Southern pine, creosoted	1.60	2.10
St. Louis	White oak, untreated	1.05	1.50
	Red oak, creosoted	1.40	1.90
San Francisco	Sap pine or cypress, untreated	.85	1.20
	Douglas fir, green, untreated	.70	1.06
	Douglas fir, empty cell, creosoted	*1.47*	2.38
Montreal	Birch or maple, untreated	.75@1.25	.75@1.25
	Birch or maple, creosoted	1.20@1.30	1.50@1.60

Current Prices of Construction Materials

Railway Supplies—Continued

TRACK SUPPLIES—Manufacturers' and dealers' quotations per 100 lb. f.o.b., Pittsburgh mill, for large mill lots, together with warehouse prices at other places named:

	Pittsburgh	Chicago	Birmingham	St. Louis	San Francisco
Standard spikes, ⅝-in. and larger	$2.80	$3.55	$3.45	$3.65@$3.75	$4.10
Track bolts	3.80@4.00	4.55	5.85	4.65@ 4.75	5.10
Standard section angle bars, splice bars or fish plates	2.75	3.40	3.75	.....	.....

Tie plates: Price at Pittsburgh mill, $2.07½ per 100 lb.

Pipe

WROUGHT-STEEL PIPE—Discounts from manufacturers' and dealers' standard lists:

	1 to 3-In. Butt Weld		3½ to 6-In. Lap Weld	
	Black	Galvanized	Black	Galvanized
Chicago, warehouse, delivered	57.3%	44.8%	53.9%	41.4%
Cleveland, warehouse, delivered	53.3%	42.3%	50.8%	37.8%
New York, warehouse, delivered	56.02%	43.48%	52.6%	40.06%
Pittsburgh, large mill lots, f.o.b.	64%	52.5%	61%	49.5%
St. Louis, warehouse, delivered	51%	38%	48%	35%

CAST-IRON PIPE—Prices of U. S. Pipe & Foundry Co., per net ton, for bell and spigot pipe, Class B and heavier, f.o.b., on regular lots of pipe:

	4-In.	6-In. and Over
Birmingham mill	$40.00@$41.00	$37.00@$38.00
Burlington (N. J.) mill	40.00	37.00
Chicago	48.20@ 49.20	45.20@ 46.20
New York	42.90	39.90
Pittsburgh	48.80@ 49.80	45.80@ 46.80
St. Louis	47.00@ 48.00	44.00@ 45.00
San Francisco	50.00@ 51.00	47.00@ 48.00

Gas pipe and Class A, $3.00 per ton extra.

SEWER PIPE—Prices delivered, per foot, for standard pipe; 6, 8 and 12-in. are single strength and 18, 24, 30 and 36-in. are double strength:

	6-In.	8-In.	12-In.	18-In.	24-In.	30-In.	36-In.
Atlanta	$0.16	$0.26	$0.45	.....	.....	.....	.....
Baltimore	.10	.30	.58	.....	$1.93	.....	$6.50
Birmingham	.25	.40	.65	$1.50	2.75	$3.90	5.85
Boston	.185	.30	.56	1.35	2.25	3.70	6.50
Chicago	.18	.28	.54	1.25	2.25	4.75	6.00
Cincinnati	.135	.21	.405	1.05	1.89	3.456	5.4325
Cleveland	.189	.294	.567	1.35	2.43	4.824	7.38
Dallas	.25	.375	.68	1.60	2.85	.....	.....
Denver	.161	.23	.414	.816	1.44	.....	.....
Detroit	.18	.28	.6075	1.50	2.70	5.12	7.91
Kansas City	.21	.29	.52	.....	1.90	3.80	.....
Los Angeles	.21	.2825	.51	1.186	2.03	3.39	5.09
Minneapolis	.16	.25	.50	1.15	1.85	3.49	4.97
Montreal	.36	.53	.78	1.48	2.75	4.20	.....
New Orleans	.195	.325	.585	1.10	2.11	.....	.....
New York	.47	.265	.52	1.30	2.34	4.47	6.86
Philadelphia	.117	.182	.351	1.05	1.89	3.60	5.6375
Pittsburgh	.0945	.147	.2835	.85	1.53	3.024	4.8175
St. Louis	.1645	.26	.468	1.092	1.872	3.65	4.80
San Francisco	.1925	.275	.495	1.155	1.98	3.30	4.95
Seattle	.22	.30	.54	1.26	2.16	3.50	.....

CLAY DRAIN TILE—Prices delivered by dealers, per 1,000 lin.ft.:

Size, In.	New York	Birm'ham	St. Louis	Dallas	San Fran.	Seattle
4	$55.00	$56.00	$50.00	$63.00	$67.50	$60.00
6	112.00	112.00	85.00	102.00	112.50	112.00

Miscellaneous

LINSEED OIL—Raw oil, f.o.b., in 1- to 4-bbl. lots, per lb.:
New York.... **$0.148** Chicago.... **$0.152** Minneapolis... **$0.158**

WHITE AND RED LEAD—Base price per 100-lb. keg, f.o.b., New York: White, dry, $13.75; White, in oil, $14.25; Red, dry, $13.75; Red, in oil, $15.25.

CHEMICALS—Water, sewage treatment, road work, round lots in the New York market:

Sulphate of aluminum, in bags, per 100 lb	$1.40@$1.45
Sulphate of copper, in bbl., per 100 lb	4.75@ 5.00
Soda ash, 58%, in bags, per 100 lb	1.32@ 1.35
Chlorine, cylinders, per lb	.04½@ .06
Bleaching powder, in drums, f.o.b. works, per 100 lb	2.00@ 2.10
Calcium chloride, flaked, in drums, f.o.b. works, per ton	22.75

MANILA ROPE—The number of feet per pound for the various sizes is as follows: 5-in., 7-ft., 6-in.; ¾-in., 6-ft., 1-in.; ⅞-in., 4-ft., 5-in.; 1-in., 3-ft., 8-in.; 1¼-in., 2-ft., 5-in.; 1½-in., 1-ft., 8-in. Following prices are quoted by dealers per pound for ¼-in. and larger:

Atlanta	$0.25	Kansas City	$0.25
Baltimore	.225	Los Angeles	.25
Birmingham	.26	Minneapolis	.22
Boston	.215	Montreal	.185
Chicago	.20	New Orleans	.25
Cincinnati	.21	New York	.205
Cleveland	.21	Philadelphia	.23
Dallas	.21	San Francisco	.205
Denver	.24	Seattle	.205
Detroit	.23	St. Louis	.205

BUILDING PAPER—Black, 50-lb., in carloads, per roll of 500 sq.ft., f.o.b., producing point **$2.20**

SLATERS FELT—In carloads, per roll, f.o.b., producing point **$0.85**

ROOFING MATERIALS—Price f.o.b., New York, delivered by dealers to contractors in carloads:

Asphalt felt, per 100 lb	$3.00
Tar felt, per 100 lb	3.00
Asphalt coating, per gal	.34½
Tar pitch, in 350 lb. barrels, per ton	28.00

PREPARED ROOFINGS—Prices delivered by dealers to contractors, in each load, f.o.b. New York, per square:

Single shingles, slate finish, sufficient to cover 100 sq.ft.	$6.12
Strip shingles, 4 in 1, hexagonal shape, with Underwriters' label	6.00
Slate surfaced roofing in rolls weighing 85 to 90 lbs.	2.50

WINDOW GLASS—United inches 25, bracket size 6x8 to 10x15, single or double thickness, discount from jobbers' list (Sept. 15, 1928), at New York warehouses:
AA..... 83% A..... 86% B..... 88%

EXPLOSIVES—Manufacturers' quotations per pound for dynamite delivered in small lots, under 200 lb.:

	Gelatin 40%	Gelatin 60%		Gelatin 40%	Gelatin 60%
Atlanta	$0.22	$0.245	Los Angeles, f.o.b.†	$0.1875	$0.2225
Baltimore	.215	.2375	Minneapolis	.2225	.2450
Birmingham	.22	.245	Montreal	.20	.24
Boston	.22	.25	New Orleans	.195	.22
Chicago	.195*	.22*	New York	.255‡	.2775‡
Cincinnati	.22	.245	Philadelphia	.215	.24
Dallas	.225	.275	St. Louis	.215	.235
Denver, f.o.b.	.19	.2125	San Francisco	.155	.18
Kansas City, Mo.	.2025	.2225	Seattle	.1525	.175

*Quantities above 500 lb. but less than a ton. †San Fernando Arsenal. ‡Special gelatin in case lots.

Lumber

Prices Are Per Thousand Feet, Board Measure

New York—Timbers, No. 1 Common, rough, delivered in Manhattan to contractor at site of job, in 20 ft. lengths and under, per M. ft., b.m.:

	Long-leaf Yellow Pine	Douglas Fir
3x4 to 8x8	$50.00	$39.00
3x10 to 10x10	60.00	40.00
3x12 to 12x12	70.00	42.00
3x14 to 14x14	80.00	50.00

Chicago—Prices, f.o.b., in carloads, No. 1 Common, rough per M. ft. b.m. For delivery to job from stock, in truckloads, add $10 per M. ft., b.m.:

	20 Ft. and Under Long-Leaf Yellow Pine	Up to 32 Ft. Douglas Fir
3x4 to 8x8	$43.00	$41.00
3x10 to 10x10	50.50	41.00
3x12 to 12x12	62.50	41.00
3x14 to 14x14	74.50	42.00

San Francisco—Douglas fir, No. 1 common, rough, at yards. For delivery to contractor at site of job, add $1.50 to $5 per M. ft., b.m.:

	10-16-18 and 20 Ft.	22 and 24 Ft.
3x3 and 4	$33.00	$36.00
3x6 and 8	33.00	36.00
3x10 and 12	33.00	36.00
3x14	37.00	39.00

Other Cities—Delivered by dealers, No. 1 Common, rough, per M. ft., b.m.:

	8x8-In. x 20 Ft. and Under				3x12 to 12x12-In. 20 Ft. and Under	
	Pine*	Fir†	Hemlock	Spruce	Pine*	Fir†
Atlanta	$55.00	.....	.....	.....	$65.00	.....
Baltimore	36.00	$50.00	$53.50	$61.00	75.00	$50.25
Birmingham	53.00	.....	.....	.....	56.50	.....
Boston	52.50	45.00	47.00	48.00	60.00	40.00
Cincinnati	47.50	58.50	.....	.....	65.00	52.50
Cleveland	63.00	63.00	.....	.....	63.00	63.00
Dallas	55.00	55.00	55.00	55.00	55.00	55.00
Denver	.....	50.00	47.50	47.50	.....	55.00
Detroit	54.00	52.00	.....	.....	68.50	52.00
Kansas City, Mo.	37.50	45.25	.....	.....	52.50	55.00
Los Angeles	.....	42.50	.....	.....	.....	44.50
Minneapolis	56.00	48.25	37.25	.....	56@58	49.75
Montreal	50.00	48.00	.....	.....	56.00	48.00
New Orleans	52.00	48.00	.....	44.00	67.00	65.00
Philadelphia	50.00	43.00	42.00	48.00	60.00	43.00
Pittsburgh	65.00	70.00	75.00	65.00	65.00	65@72
St. Louis	46.50	42.00	42.00	.....	57.50	44.00
Seattle	.....	18.00	.....	.....	.....	19@20

	1x10 In. x 16 Ft. and Under			2x10 In. x 16 Ft. T. & Gr.	
	Pine*	Fir†	Hemlock	Pine*	Fir†
Atlanta	$60.00	.....	.....	$42.50	.....
Baltimore	55.00	$44.50	$44.00	.....	.....
Birmingham	36.00	.....	.....	45.00	.....
Boston	46.50	40.00	42.00	48.50	$45.00
Cincinnati	61.00	52.50	.....	38.00	50.00
Cleveland	60.00	55.00	.....	65.00	58.00
Dallas	60.00	.....	.....	55.00	.....
Denver	.....	38.00	38.50	.....	44.00
Detroit	48.50	45.00	.....	48.50	47.00
Kansas City, Mo.	50.50	36.75	.....	36.75	34.75
Los Angeles	.....	41.50	.....	.....	55.00
Minneapolis	51.00	42.00	38.75	49.00	41.00
Montreal	56.00	.....	.....	.....	.....
New Orleans	49.00	49.00	.....	59.00	55.00
Philadelphia	52.00	43.00	41.00	55.00	44.00
Pittsburgh	50.00	60.00	59.00	42.00	.....
St. Louis	44.50	42.00	41.00	45.00	42.00
Seattle	.....	18.00	.....	.....	19.00

*Long-leaf yellow pine. †Douglas fir.

PILES—Prices of Nichols Bros., 90 West St., N.Y.C., per lineal foot, pine, with bark on, f.o.b., New York; delivered from barge, 1½ to 2c. per ft. additional:

Dimensions	Points	Length	Barge	Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.14½	$0.18
12 in.—2 ft. from butt	6 in.	50 to 59 ft.	.19	.23
12 in.—2 ft. from butt	6 in.	60 to 69 ft.	.21½	.25
14 in.—2 ft. from butt	6 in.	50 to 69 ft.	.25½	.36
14 in.—2 ft. from butt	6 in.	70 to 79 ft.	.27½	.31
14 in.—2 ft. from butt	5 in.	80 to 85 ft.	.33	.41
14 in.—2 ft. from butt	5 in.	85 to 89 ft.	.38	.45

Unit Prices From Current Construction Bids

Relief Sewer in St. Louis Business Section; 4,096 Ft. Rock Tunnel, 110 Ft. Open Cut

Awarded March, 1930, to the Frazier-Davis Construction Co. Contract price: $358,258. Engineer's estimate: $395,000.

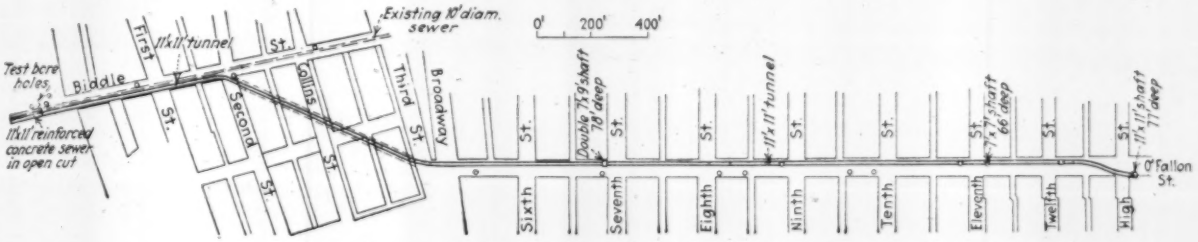


FIG. 1—LOCATION PLAN, BIDDLE ST. RELIEF SEWER

THE Biddle St. (St. Louis) relief sewer runs along O'Fallon St. from High to Third, diagonally across two blocks to Biddle, thence to the Mississippi River. Except for the first 110 ft., this sewer is built entirely in a tunnel through rock under the business section of St. Louis at depths of from 70 to 90 ft. The 110 ft. next to the river is built in cut-and-cover between an existing sewer and the high wall of the Ashley St. plant of the Union Electric Co. Fig. 1 shows the layout of the work. Besides the construction shaft at Seventh St., intake shafts are provided at Ninth St. and at High St. The tunnel receives excess stormwater from the existing overloaded sewer system into these shafts. Fig. 1 also shows the positions of the sixteen diamond-drill borings made for the city by the Ameling Prospecting Co. The material apparently is typical St. Louis limestone. The short length and crowded quarters of the open-cut section naturally brought high prices.

The sewer is a semicircular arch with vertical sidewalls, 5½ ft. to spring line and 5½ ft. radius (Fig. 2). Included in the job are 82 ft. of egg-shaped and 105 ft. of circular brick complementary sewers.

Excavation — Excavation is in three classes: A, solid limestone in the original bed or well-defined ledges, and all boulders or loose pieces 27 cu.ft. or more; B, shale, soap-

		A	B	C	D	E	F
Open Cut—11x11-Ft. Sewer:							
Class A excavation	50 cu.yd.	$6.00	$12.00	$6.10	$10.00	$6.00	$10.00
Class B excavation	200 cu.yd.	4.00	10.00	4.30	4.00	4.00	5.00
Class C excavation	1,450 cu.yd.	4.00	5.00	2.15	2.00	2.00	2.50
Class A conc. (extra)	270 cu.ft.	0.50	0.83	0.50	0.80	0.65	1.25
Class B conc. (extra)	930 cu.ft.	0.50	0.81	0.40	0.65	0.60	1.00
Brick masonry in manholes	190 cu.ft.	0.90	0.86	0.75	1.00	1.00	0.80
Compl. sewer 11x11-ft. horseshoe shaped of reinf. conc	110 lin.ft.	55.00	114.74	62.00	60.00	70.00	35.00
Manhole opening on 11-ft. horseshoe shaped reinf. conc. sewer complete	1	70.00	15.00	12.00	50.00	100.00	200.00
Cast iron	540 lb.	0.07	0.10	0.06	0.08	0.08	0.06
Steel sheetpiling in place, complete	418 sq.ft.	1.50	2.00	1.50	2.50	4.00	5.00
Lumber left in trench	5 M.ft.b.m.	50.00	50.00	50.00	50.00	50.00	50.00
Tunnel:							
Type 11A tunnel complete	3,596 lin.ft.	76.00	72.50	80.50	85.00	87.00	90.00
Type 11B tunnel, complete	300 lin.ft.	76.00	80.00	90.00	95.00	110.00	110.00
Type 11C tunnel, complete	200 lin.ft.	76.00	86.75	94.00	120.00	115.00	130.00
Excav. for enlargement of section	200 cu.yd.	4.00	11.20	15.00	10.00	20.00	25.00
Class A conc. (extra)	5,000 cu.ft.	0.50	0.65	0.60	0.70	0.60	1.00
Extra drilling	300 lin.ft.	0.50	1.00	2.50	0.25	1.00	5.00
Holes for plumbing	200 lin.ft.	12.00	12.50	12.00	7.50	10.00	5.00
Shafts:							
Top sect. for 7x7-ft. shaft, complete	1	90.00	360.55	350.00	350.00	250.00	300.00
Top sect. for 11x11-ft. shaft, complete	1	280.00	635.30	725.00	400.00	400.00	425.00
Top sect. for double 7x9-ft. shaft, complete	1	300.00	592.28	700.00	500.00	600.00	375.00
Earth sect. for 7x7-ft. shaft, complete	29 lin.ft.	20.00	69.85	84.00	75.00	75.00	150.00
Earth sect. for 11x11-ft. shaft, complete	35 lin.ft.	50.00	111.21	155.00	90.00	100.00	250.00
Earth sect. for double 7x9-ft. shaft, complete	32 lin.ft.	100.00	152.52	184.00	200.00	120.00	500.00
Rock sect. for 7x7-ft. shaft, complete	15 lin.ft.	50.00	89.00	84.00	80.00	75.00	150.00
Rock sect. for 11x11-ft. shaft, complete	11 lin.ft.	60.00	144.05	168.00	100.00	100.00	250.00
Rock sect. for double 7x9-ft. shaft, complete	22 lin.ft.	100.00	175.58	184.00	150.00	120.00	500.00
Special intake sect. for 7x7-ft. shaft, complete	1	500.00	214.41	630.00	250.00	500.00	500.00
Special intake sect. for double 7x9-ft. shaft, complete	1	600.00	268.00	1,700.00	700.00	700.00	500.00
Special intake and reduc. sect. for 11x11-ft. shaft, complete	1	4,000.00	5,070.77	4,100.00	1,500.00	4,500.00	3,000.00
Foul water troughs	45 lin.ft.	10.00	5.00	6.10	5.00	1.50	10.00
Foul water drops	150 lin.ft.	6.00	10.00	6.10	5.00	2.00	10.00
Open Cut Connecting Existing Sewers:							
Class A excavation	40 cu.yd.	10.00	10.00	12.00	12.00	6.00	12.00
Class B excavation	100 cu.yd.	4.00	10.00	12.00	4.00	4.00	5.00
Class C excavation	660 cu.yd.	4.00	5.00	6.00	2.00	2.00	2.50
Class B conc. (extra)	300 cu.ft.	0.70	0.50	0.50	0.70	0.60	0.80
Brick masonry in manhole and bulkhead	70 cu.ft.	1.00	0.85	0.75	1.00	1.00	0.80
Sewer pipe 12 in. in diameter	50 lin.ft.	0.80	0.75	0.75	1.00	1.00	0.80
Composition sewer, 2½x3½-ft. egg-shaped brick	30 lin.ft.	13.00	9.00	4.25	10.00	12.00	6.00
Complete sewer, 4x5-ft. egg-shaped brick	52 lin.ft.	20.00	12.50	9.75	15.00	16.00	12.00
Complete sewer, 78 in. in diameter, brick	55 lin.ft.	25.00	18.80	19.50	20.00	25.00	20.00
Complete sewer, 84 in. in diameter, brick	50 lin.ft.	25.00	18.80	22.00	25.00	30.00	25.00
Lumber left in trench	10 M.ft.b.m.	50.00	50.00	50.00	50.00	50.00	50.00
Removing old brick wearing surface and bedding course	146 sq.yd.	0.70	0.25	0.30	1.50	0.50	1.50
Removing old granite block wearing surface and bedding course	70 sq.yd.	0.40	0.35	0.30	1.00	0.50	1.50
Removing old conc. base under existing pavements	216 sq.yd.	1.00	1.00	0.25	1.00	1.00	2.00
Removing existing brick sidewalks	90 sq.ft.	0.10	0.05	0.25	0.10	0.05	0.25
Removing existing curb	25 lin.ft.	0.60	0.25	0.60	1.00	0.50	1.50
Vitr. brick wearing surface and bed course	146 sq.yd.	4.00	2.00	1.65	3.00	3.00	4.00
Relaying granite block pavement and bedding course	70 sq.yd.	2.05	1.00	1.80	3.00	2.50	4.00
Conc. foundation for pavement 6 in. thick	216 sq.yd.	3.00	1.25	2.50	3.00	1.75	3.00
Relaying brick sidewalk	90 sq.ft.	0.10	0.10	1.50	0.20	0.15	1.00
Resetting curb	25 lin.ft.	1.00	0.50	1.25	1.50	0.75	2.00
Totals		$358,238	$370,847	$397,817	$408,784	$422,729	$469,344

Current Prices of Construction Materials

Railway Supplies—Continued

TRACK SUPPLIES—Manufacturers' and dealers' quotations per 100 lb. f.o.b., Pittsburgh mill, for large mill lots, together with warehouse prices at other places named:

	Pittsburgh	Chicago	Birmingham	St. Louis	San Francisco
Standard spikes, ⅝-in. and larger	$2.80	$3.55	$3.45	*$3.65@$3.75*	**$4.10**
Track bolts	3.80@4.00	4.55	5.85	*4.65@ 4.75*	**5.10**
Standard section angle bars, splice bars or fish plates	2.75	3.40	3.75	.....	.....

Tie plates: Price at Pittsburgh mill, $2.07½ per 100 lb.

Pipe

WROUGHT-STEEL PIPE—Discounts from manufacturers' and dealers' standard lists:

	1 to 3-In. Butt Weld		3½ to 6-In. Lap Weld	
	Black	Galvanized	Black	Galvanized
Chicago, warehouse, delivered	57.3%	44.8%	53.9%	41.4%
Cleveland, warehouse, delivered	53.3%	42.3%	50.8%	37.8%
New York, warehouse, delivered	56.02%	43.48%	52.6%	40.06%
Pittsburgh, large mill lots, f.o.b.	64%	52.5%	61%	49.5%
St. Louis, warehouse, delivered	*51%*	*38%*	*48%*	*35%*

CAST-IRON PIPE—Prices of U. S. Pipe & Foundry Co., per net ton, for bell and spigot pipe, Class B and heavier, f.o.b., on regular lots of pipe:

	4-In.	6-In. and Over
Birmingham mill	$40.00@$41.00	$37.00@$38.00
Burlington (N. J.) mill	40.00	37.00
Chicago	48.20@ 49.20	45.20@ 46.20
New York	42.90	39.90
Pittsburgh	48.80@ 49.80	45.80@ 46.80
St. Louis	47.00@ 48.00	44.00@ 45.00
San Francisco	50.00@ 51.00	47.00@ 48.00

Gas pipe and Class A, $3.00 per ton extra.

SEWER PIPE—Prices delivered, per foot, for standard pipe; 6, 8 and 12-in. are single strength and 18, 24, 30 and 36-in. are double strength:

	6-In.	8-In.	12-In.	18-In.	24-In.	30-In.	36-In.
Atlanta	$0.16	$0.26	*$0.45*	.....	.....	.....	.....
Baltimore	.10	.30	.58	.....	$1.93	.....	$6.50
Birmingham	.25	.40	.65	$1.50	2.75	$3.90	**5.85**
Boston	.185	.30	**.56**	1.35	2.25	3.70	6.50
Chicago	.18	.28	.54	1.25	2.25	4.75	6.00
Cincinnati	.135	.21	.405	1.05	1.89	3.456	5.4325
Cleveland	.189	.294	.567	1.35	2.43	4.824	7.38
Dallas	.25	.375	.68	1.60	2.85	.....	.....
Denver	.161	.23	.414	.816	1.44	.....	.....
Detroit	.18	.28	.6075	1.50	2.70	5.12	7.91
Kansas City	.21	.29	.52	.....	1.90	3.80	.....
Los Angeles	.21	.2825	.51	1.186	2.03	3.39	5.09
Minneapolis	.16	.25	.50	1.15	1.85	3.49	4.97
Montreal	.36	.53	.78	1.48	2.75	4.20	.....
New Orleans	.195	.325	.585	1.10	2.11	.....	.....
New York	.47	*.265*	*.52*	*1.30*	*2.44*	*4.47*	*6.86*
Philadelphia	.117	.182	.351	1.05	1.89	3.60	5.6375
Pittsburgh	.0945	.147	.2835	.85	1.53	3.024	4.8175
St. Louis	.1645	.26	.468	1.092	1.872	3.65	4.80
San Francisco	.1925	.275	.495	1.155	1.98	3.30	4.95
Seattle	.22	.30	.54	1.26	2.16	3.50	.....

CLAY DRAIN TILE—Prices delivered by dealers, per 1,000 lin.ft.:

Size, In.	New York	Birm'ham	St. Louis	Dallas	San Fran.	Seattle
4	$55.00	$56.00	$50.00	$63.00	$67.50	$60.00
6	112.00	112.00	85.00	*103.00*	112.50	112.00

Miscellaneous

LINSEED OIL—Raw oil, f.o.b., in 1- to 4-bbl. lots, per lb.:
New York.... **$0.148** Chicago.... **$0.152** Minneapolis... **$0.158**

WHITE AND RED LEAD—Base price per 100-lb. keg, f.o.b., New York: White, dry, $13.75; White, in oil, $14.25; Red, dry, $13.75; Red, in oil, $15.25.

CHEMICALS—Water, sewage treatment, road work, round lots in the New York market:

Sulphate of aluminum, in bags, per 100 lb	$1.40@$1.45
Sulphate of copper, in bbl., per 100 lb	**4.75@** 5.00
Soda ash, 58%, in bags, per 100 lb	1.32@ 1.35
Chlorine, cylinders, per lb	.04½@ .06
Bleaching powder, in drums, f.o.b. works, per 100 lb	2.00@ 2.10
Calcium chloride, flaked, in drums, f.o.b. works, per ton	22.75

MANILA ROPE—The number of feet per pound for the various sizes is as follows: ¾-in., 7-ft., 6-in.; ⅞-in., 6-ft., 1-in.; 1¼-in., 4-ft., 5-in.; 1-in., 3-ft., 8-in.; 1¼-in., 2-ft., 5-in.; 1½-in., 1-ft., 8-in. Following prices are quoted by dealers per pound for ¼-in. and larger:

Atlanta	$0.25	Kansas City	$0.25
Baltimore	.225	Los Angeles	.25
Birmingham	.26	Minneapolis	.22
Boston	.215	Montreal	.185
Chicago	.20	New Orleans	.25
Cincinnati	.21	New York	.205
Cleveland	.21	Philadelphia	.23
Dallas	**.21**	San Francisco	.205
Denver	.24	Seattle	*.205*
Detroit	.23	St. Louis	*.205*

BUILDING PAPER—Black, 50-lb., in carloads, per roll of 500 sq.ft., f.o.b., producing point **$2.20**

SLATERS FELT—In carloads, per roll, f.o.b., producing point **$0.85**

ROOFING MATERIALS—Price f.o.b., New York, delivered by dealers to contractors in carloads:

Asphalt felt, per 100 lb	**$1.00**
Tar felt, per 100 lb	**3.00**
Asphalt coating, per gal	.34½
Tar pitch, in 350 lb. barrels, per ton	28.00

PREPARED ROOFINGS—Prices delivered by dealers to contractors, in each load, f.o.b. New York, per square:

Single shingles, slate finish, sufficient to cover 100 sq.ft.	$6.12
Strip shingles, 4 in 1, hexagonal shape, with Underwriters' label	**6.00**
Slate surfaced roofing in rolls weighing 85 to 90 lbs.	2.50

WINDOW GLASS—United inches 25, bracket size 6x8 to 10x15, single or double thickness, discount from jobbers' list (Sept. 15, 1928), at New York warehouses:
AA..... 83% A..... 86% B..... 88%

EXPLOSIVES—Manufacturers' quotations per pound for dynamite delivered in small lots, under 200 lb.:

	Gelatin 40%	Gelatin 60%		Gelatin 40%	Gelatin 60%
Atlanta	$0.22	$0.245	Los Angeles, f.o.b.†	$0.1875	$0.2225
Baltimore	.215	.2375	Minneapolis	.2225	.2450
Birmingham	.22	.245	Montreal	.20	.24
Boston	.22	.25	New Orleans	.195	.22
Chicago	.195*	.22*	New York	.255‡	.2775‡
Cincinnati	.22	.245	Philadelphia	.215	.24
Dallas	**.225**	**.275**	St. Louis	.215	.235
Denver, f.o.b.	.19	.2125	San Francisco	.155	.18
Kansas City, Mo.	.2025	.2225	Seattle	.1525	.175

*Quantities above 500 lb. but less than a ton. †San Fernando Arsenal. ‡Special gelatin in case lots.

Lumber

Prices Are Per Thousand Feet, Board Measure

New York—Timbers, No. 1 Common, rough, delivered in Manhattan to contractor at site of job, in 20 ft. lengths and under, per M. ft., b.m.:

	Long-leaf Yellow Pine	Douglas Fir
3x4 to 8x8	$50.00	$39.00
3x10 to 10x10	60.00	40.00
3x12 to 12x12	70.00	42.00
3x14 to 14x14	80.00	50.00

Chicago—Prices, f.o.b., in carloads, No. 1 Common, rough per M. ft. b.m. For delivery to job from stock, in truckloads, add $10 per M. ft., b.m.:

	20 Ft. and Under Long-Leaf Yellow Pine	Up to 32 Ft. Douglas Fir
3x4 to 8x8	$43.00	$41.00
3x10 to 10x10	50.50	41.00
3x12 to 12x12	62.50	41.00
3x14 to 14x14	74.50	42.00

San Francisco—Douglas fir, No. 1 common, rough, at yards. For delivery to contractor at site of job, add $1.50 to $5 per M. ft., b.m.:

	10-16-18 and 20 Ft.	22 and 24 Ft.
3x3 and 4	$33.00	$36.00
3x6 and 8	33.00	36.00
3x10 and 12	33.00	36.00
3x14	37.00	39.00

Other Cities—Delivered by dealers, No. 1 Common, rough, per M. ft., b.m.:

	8x8-In. x 20 Ft. and Under				3x12 to 12x12-In. 20 Ft. and Under	
	Pine*	Fir†	Hemlock	Spruce	Pine*	Fir†
Atlanta	$55.00	.....	.....	.....	$65.00	.....
Baltimore	36.00	$50.00	$53.50	$61.00	75.00	$50.25
Birmingham	53.00	.....	.....	.....	56.50	.....
Boston	52.50	45.00	47.00	48.00	60.00	40.00
Cincinnati	47.50	58.50	.....	.....	65.00	52.50
Cleveland	63.00	63.00	.....	.....	63.00	63.00
Dallas	55.00	55.00	55.00	55.00	55.00	55.00
Denver	.....	50.00	47.50	47.50	.....	55.00
Detroit	54.00	52.00	.....	.....	68.50	52.00
Kansas City, Mo.	*37.50*	*45.25*	.....	.....	52.50	55.00
Los Angeles	.....	42.50	.....	.....	.....	44.50
Minneapolis	*56.00*	*48.25*	*37.25*	.....	*66@58*	*49.75*
Montreal	50.00	48.00	.....	.....	56.00	48.00
New Orleans	52.00	48.00	.....	44.00	67.00	65.00
Philadelphia	50.00	43.00	42.00	48.00	60.00	43.00
Pittsburgh	65.00	70.00	75.00	65.00	65.00	65@72
St. Louis	*46.50*	*42.00*	*42.00*	.....	*57.50*	44.00
Seattle	.....	*18.00*	.....	.....	.....	*19@20*

	1x10 In. x 16 Ft. and Under			2x10 In. x 16 Ft. T. & Gr.	
	Pine*	Fir†	Hemlock	Pine*	Fir†
Atlanta	$60.00	.....	.....	$42.50	.....
Baltimore	*55.00*	*$44.50*	$44.00	.....	.....
Birmingham	36.00	.....	.....	45.00	.....
Boston	**46.50**	40.00	42.00	48.50	$45.00
Cincinnati	61.00	52.50	.....	38.00	50.00
Cleveland	60.00	55.00	.....	65.00	58.00
Dallas	60.00	.....	.....	55.00	.....
Denver	.....	38.00	38.50	.....	44.00
Detroit	48.50	45.00	.....	48.50	47.00
Kansas City, Mo.	*50.50*	*36.75*	.....	*36.75*	*34.75*
Los Angeles	.....	41.50	.....	.....	55.00
Minneapolis	*51.00*	*42.00*	*38.75*	*49.00*	*41.00*
Montreal	56.00	.....	.....	.....	.....
New Orleans	49.00	49.00	.....	59.00	55.00
Philadelphia	52.00	43.00	41.00	55.00	44.00
Pittsburgh	50.00	60.00	59.00	42.00	.....
St. Louis	**44.50**	42.00	41.00	45.00	42.00
Seattle	.....	*18.00*	.....	.....	*19.00*

*Long-leaf yellow pine. †Douglas fir.

PILES—Prices of Nichols Bros., 90 West St., N.Y.C., per lineal foot, pine, with bark on, f.o.b., New York; delivered from barge, 1½ to 2c. per ft. additional:

Dimensions	Points	Length	Barge	Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.14½	$0.18
12 in.—2 ft. from butt	6 in.	50 to 59 ft.	.19	.23
12 in.—2 ft. from butt	6 in.	60 to 69 ft.	.21½	.25
14 in.—2 ft. from butt	6 in.	50 to 69 ft.	.25½	.36
14 in.—2 ft. from butt	6 in.	70 to 79 ft.	.27½	.31
14 in.—2 ft. from butt	5 in.	80 to 85 ft.	.33	.41
14 in.—2 ft. from butt	5 in.	85 to 89 ft.	.38	.45

Unit Prices From Current Construction Bids

Relief Sewer in St. Louis Business Section; 4,096 Ft. Rock Tunnel, 110 Ft. Open Cut

Awarded March, 1930, to the Frazier-Davis Construction Co. Contract price: $358,258. Engineer's estimate: $395,000.

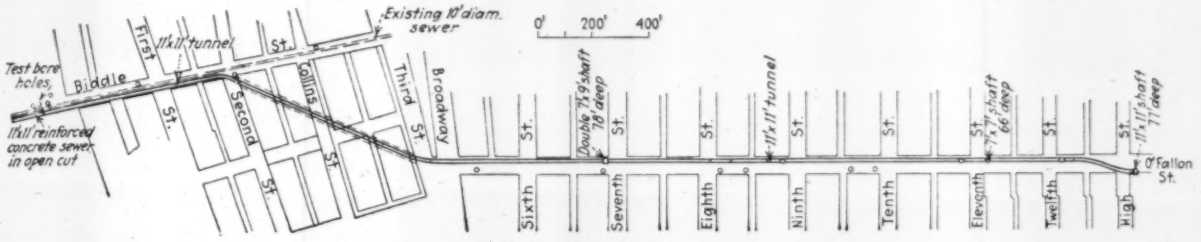


FIG. 1—LOCATION PLAN, BIDDLE ST. RELIEF SEWER

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Class A excavation	50 cu.yd.	$6.00	$12.00	$6.10	$10.00	$6.00	$10.00
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Lumber left in trench	5 M.ft.b.m.	50.00	50.00	50.00	50.00	50.00	50.00
Tunnel:							
Type 11A tunnel complete	3,596 lin.ft.	76.00	72.50	80.50	85.00	87.00	90.00
Type 11B tunnel, complete	300 lin.ft.	76.00	80.00	90.00	95.00	110.00	110.00
Type 11C tunnel, complete	200 lin.ft.	76.00	86.75	94.00	120.00	115.00	130.00
Excav. for enlargement of section	200 cu.yd.	4.00	11.20	15.00	10.00	20.00	25.00
Class A conc. (extra)	5,000 cu.ft.	0.50	0.65	0.60	0.70	0.60	1.00
Extra drilling	300 lin.ft.	0.50	1.00	2.50	0.25	1.00	5.00
Holes for plumbing	200 lin.ft.	12.00	12.50	12.00	7.50	10.00	5.00
Shafts:							
Top sect. for 7x7-ft. shaft, complete	1	90.00	360.55	350.00	350.00	250.00	300.00
Top sect. for 11x11-ft. shaft, complete	1	280.00	635.30	725.00	400.00	400.00	425.00
Top sect. for double 7x9-ft. shaft, complete	1	300.00	592.28	700.00	500.00	600.00	375.00
Earth sect. for 7x7-ft. shaft, complete	29 lin.ft.	20.00	69.85	84.00	75.00	75.00	150.00
Earth sect. for 11x11-ft. shaft, complete	35 lin.ft.	50.00	111.21	155.00	90.00	100.00	250.00
Earth sect. for double 7x9-ft. shaft, complete	32 lin.ft.	100.00	152.52	184.00	200.00	120.00	500.00
Rock sect. for 7x7-ft. shaft, complete	15 lin.ft.	50.00	89.00	84.00	80.00	75.00	150.00
Rock sect. for 11x11-ft. shaft, complete	11 lin.ft.	60.00	144.05	168.00	100.00	100.00	250.00
Rock sect. for double 7x9-ft. shaft, complete	22 lin.ft.	100.00	175.58	184.00	150.00	120.00	500.00
Special intake sect. for 7x7-ft. shaft, complete	1	500.00	214.41	630.00	250.00	500.00	500.00
Special intake sect. for double 7x9-ft. shaft, complete	1	600.00	268.00	1,700.00	700.00	700.00	500.00
Special intake and reduc. sect. for 11x11-ft. shaft, complete	1	4,000.00	5,070.77	4,100.00	1,500.00	4,500.00	3,000.00
Foul water troughs	45 lin.ft.	10.00	5.00	6.10	5.00	1.50	10.00
Foul water drops	150 lin.ft.	6.00	10.00	6.10	5.00	2.00	10.00
Open Cut Connecting Existing Sewers:							
Class A excavation	40 cu.yd.	10.00	10.00	12.00	12.00	6.00	12.00
Class B excavation	100 cu.yd.	4.00	10.00	12.00	4.00	4.00	5.00
Class C excavation	660 cu.yd.	4.00	5.00	6.00	2.00	2.00	2.50
Class B conc. (extra)	300 cu.ft.	0.70	0.50	0.50	0.70	0.60	0.80
Brick masonry in manhole and bulkhead	70 cu.ft.	1.00	0.85	0.75	1.00	1.00	0.80
Sewer pipe 12 in. in diameter	50 lin.ft.	0.80	0.75	0.75	1.00	1.00	0.80
Composition sewer, 2½x3½-ft. egg-shaped brick	30 lin.ft.	13.00	9.00	4.25	10.00	12.00	6.00
Complete sewer, 4x5-ft. egg-shaped brick	52 lin.ft.	20.00	12.50	9.75	15.00	16.00	12.00
Complete sewer, 78 in. in diameter, brick	55 lin.ft.	25.00	18.80	19.50	20.00	25.00	20.00
Complete sewer, 84 in. in diameter, brick	50 lin.ft.	25.00	18.80	22.00	25.00	30.00	25.00
Lumber left in trench	10 M.ft.b.m.	50.00	50.00	50.00	50.00	50.00	50.00
Removing old brick wearing surface and bedding course	146 sq.yd.	0.70	0.25	0.30	1.50	0.50	1.50
Removing old granite block wearing surface and bedding course	70 sq.yd.	0.40	0.35	0.30	1.00	0.50	1.50
Removing old conc. base under existing pavements	216 sq.yd.	1.00	1.00	0.25	1.00	1.00	2.00
Removing existing brick sidewalks	90 sq.ft.	0.10	0.05	0.25	0.10	0.05	0.25
Removing existing curb	25 lin.ft.	0.60	0.25	0.60	1.00	0.50	1.50
Vitr. brick wearing surface and bed course	146 sq.yd.	4.00	2.00	1.65	3.00	3.00	4.00
Relaying granite block pavement and bedding course	70 sq.yd.	2.05	1.00	1.80	3.00	2.50	4.00
Conc. foundation for pavement 6 in. thick	216 sq.yd.	3.00	1.25	2.50	3.00	1.75	3.00
Relaying brick sidewalk	90 sq.ft.	0.10	0.10	1.50	0.20	0.15	1.00
Resetting curb	25 lin.ft.	1.00	0.50	1.25	1.50	0.75	2.00
Totals		$358,238	$370,847	$397,817	$408,784	$422,729	$469,344

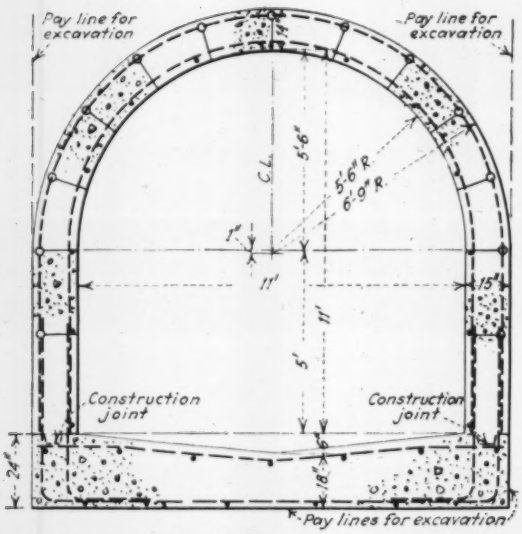


FIG. 2—TYPICAL 11-FT. SEWER SECTION

Section shown is for open cut. Tunnels have same interior dimensions as open-cut section with following thickness of unreinforced-concrete lining: type 11A, used where there is more than 13 ft. of rock cover above spring line, walls and arch 8 in., invert 8 in. at shoulder and 5 in. at center line; type 11B, used where there is more than 8 ft. and less than 13 ft. rock cover above spring line, arch above spring line 12 in., walls below spring line 6 in., invert 8 in. at shoulders and 5 in. at center line; type 11C, used where top of rock is between spring line and 8 ft. above spring line, arch above spring line 18 in., walls below spring line 9 in., invert 8 in. at shoulders and 5 in. at center line.

stone, slate, fireclay, macadam or telford pavements, brick, masonry and stone of 1 to 27 cu.ft.; C, other excavation. Excavation includes removal of all obstructions on street surfaces, any necessary shoring, assuring uninterrupted flow of surface water during work, protecting surface and subsurface structures, and restoration. The excavated material is the property of the contractor and may be used as coarse aggregate or disposed of.

Concrete—Class A concrete is made of one sack of cement, 1½ to 2½ cu.ft. of dry, fine aggregate, 2½ to 4 cu.ft. of coarse aggregate, and not more than 6½ gal. of water. Each cubic yard of concrete must contain not less than six sacks of cement.

Class B concrete is made of one sack of cement, 2¼ to 3¾ cu.ft. of fine aggregate, 3¾ to 6 cu.ft. of coarse and not more than 7½ gal. of water. There must be four sacks of cement per cubic yard.

Shafts—The three shafts, respectively 7x7 ft., 7x9 ft. and 11x11 ft., may be used for construction purposes, but the surface plant must not block traffic. They, like the tunnel, are lined throughout with class A concrete. Prices include restoration of surface; removal, disposal and backfilling; making and placing shaft covers.

Guarantee—The contractor guarantees the job for one year from date of acceptance. Time of completion is 46 weeks, with a $25 per day penalty.

Bids were received March 4 and contract was awarded to the lowest bidder for $358,258, or 11 per cent below the average of the six bids. The tabulation gives the unit prices of all the bidders: (A) Frazier-Davis Construction Co.; (B) Byrne Bros. Construction Co.; (C) Fruin-Colnon Contracting Co., Inc.; (D) J. J. Gilmore; (E) Stiers Bros. Construction Co.; (F) Martin & Reilly.

Filtration and Pumping Plant, Erie, Pa.

BIDS were opened Feb. 25 and contracts were awarded Feb. 28, 1930, for the million-dollar West Side filtration plant and pumping station at Erie, Pa. The plant, located on Erie Harbor about a third of a mile west of the city limits, will have an ultimate capacity of 72,000,000 gal. per day. The intake, a 72-in. steel pipe line terminating in a crib, is already under contract. The portion of the plant to be built at present includes: (1) a low-service pumping station with present capacity of 16,000,000 gal. but with space for 72,000,000 gal. of pumping units; (2) a high-service pumping station with the same capacity; (3) sedimentation basins in two units; (4) mixing chambers in eight units; (5) filters in eight units of 2,000,000 gal. each.

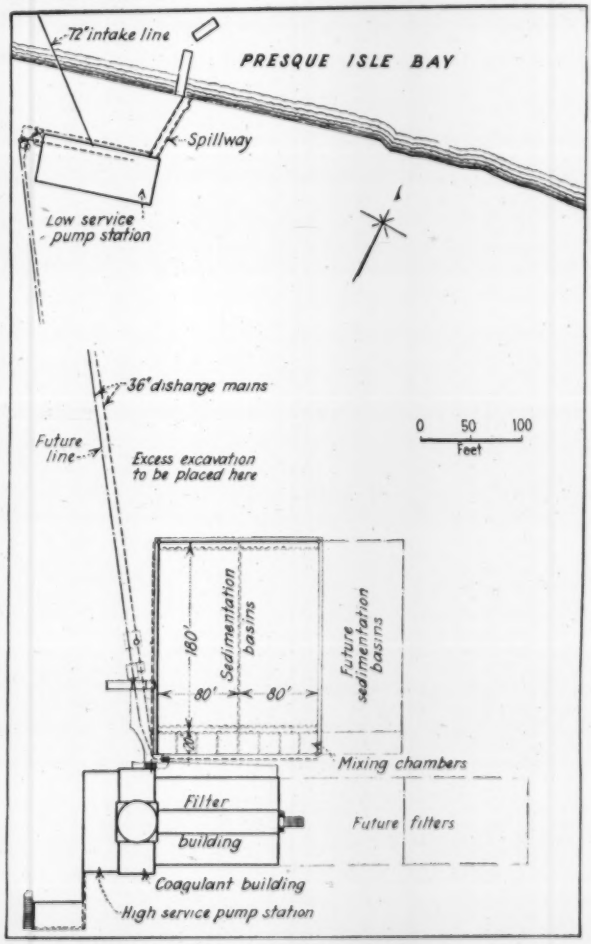
The project was awarded in five contracts, as follows: (1) substructure and superstructure, Engstrom & Wynn, Wheeling, $686,000, 69 per cent of total cost of project; (2) heating and plumbing, Scobell & Winston, $26,400, 3 per cent; (3) electric light and wiring, Robertson Electric Construction Co., $50,000, 5 per cent; (4) filter equipment and piping, Norwood Engineering Co., Florence, Mass., $204,343, 20 per cent; (5) pumping equipment, Worthington Pump & Machinery Corp., $31,145, 3 per cent; total cost, $997,888.

All prices except a few "extra" materials were lump sum. The chief cost elements of the building contract were as follows:

		Per Cent of Total Substr.	Bldg
Excav., grading	$53,000	13	
Concrete	250,000	59	
Piping	59,000	14	
Equipment	23,000	5	
Sewers, drainage	33,000	8	
Roadways	4,000	1	
Substructure	$422,000	100	61
Superstructure	279,000	...	39
	$701,000		
After deducting $15,000 for combined	686,000		100

Unit prices were asked on extra materials covering all contracts. The lowest three prices for extra items are listed below.

Earth excav., cu.yd.	$0.60	$0.70	$1.00
Rock excav., cu.yd.	3.00	4.50	5.00
Plain concr., cu.yd.	10.00	14.00	14.00
Rein. concr., cu.yd.	20.00	22.00	24.00
Rein. steel, lb.	0.045	0.05	0.05
C.-i. pipe, ton	50.00	65.00	75.00
C.-i. fittings, lb.	0.075	0.08	0.09
Special c.-i. fittings, lb.	0.09	0.10	0.10
Structural steel, lb.	0.05	0.05	0.05



HIGH- AND LOW-SERVICE PUMPING STATIONS, AND FILTRATION PLANT, ERIE, PA.

CONSTRUCTION NEWS

Some of the Week's Large Projects

For further details turn so the appropriate sections in this issue

Location	Project	Cost	Status
Waterworks			
Springfield (Ill.)	Water supply	$2,500,000	Bonds voted
Sewers			
Irvington (N. J.)	Sewer	1,000,000	Proposed
Bridge			
Bucksport (Me.)	Bridge		Bids asked
Railways			
Oregon and California	Railway	3,570,000	Proposed
Sports and Parks			
Glen Cove (N. Y.)	Park	1,000,000	Proposed
Unclassified			
Minnesota and North Dakota	Gas pipe line	4,500,000	Proposed
New Mexico, Texas and Arizona	Gas pipe line	14,000,000	Proposed
Factories and Mills			
Corpus Christi (Tex.)	Oil refinery	1,000,000	Proposed
Amphill (Va.)	Factory	2,000,000	Separate contracts
Buildings			
Battle Creek	Bank	1,500,000	Bids asked
Dayton	Hospital	1,500,000	Proposed
New York	Office	1,000,000	Contract
New York	Office	3,000,000	Proposed
Bayonne (N. J.)	Municipal	1,500,000	Proposed
Rochester	Almshouse and hospital	3,300,000	Bids asked
New Haven	University	6,000,000	Contract
Suffield (Conn.)	School	1,000,000	Proposed
New York	High school	1,600,000	Proposed
Cambridge (Mass.)	University	5,000,000	Proposed
Shaker Heights (O.)	School	1,125,000	Bids asked
Richmond (Va.)	School	1,000,000	Bids asked
Chicago	Theatre	1,500,000	Proposed
Newark (N. J.)	Theatre	1,000,000	Bids asked
Albany (N. Y.)	Theatre	3,000,000	Bids asked
New York	Theatre	1,000,000	Proposed
Cincinnati	Theatre	1,000,000	Proposed
Burbank (Calif.)	Studio, etc.	1,000,000	Proposed
Indianapolis	Telephone exchange	1,000,000	Proposed
New York	Telephone exchange	1,000,000	Contract

WATERWORKS

PROPOSED WORK

Kan., Ford—Waterworks distribution system, incl. tank on tower, mains, $30,000. Project postponed until fall. Shockley Eng. Co., 800 Graphic Arts Bldg., Kansas City, Mo., engrs. Noted June 5.

Mass., Mansfield—Town, Bd. Selectmen, mains in Otis and Gilbert Sts. $15,500.

Mo., Grandview — Preliminary plans waterworks, distribution system. W. B. Rollins & Co., 339 Railway Exch. Bldg., Kansas City, engrs.

Mo., Lancaster—Preliminary plans extending distribution system, surface reservoir, filtration plant, pumping equipment. W. B. Rollins & Co., 339 Railway Exch. Bldg., Kansas City, engrs.

N. J., Hammonton—Bd. Town Council, Town Hall, extending waterworks, incl. 6 and 8 in. main long White Horse Pike, North Egg Harbor Rd. and Orchard St. $15,000. J. A. Baker, town engr. Noted June 19.

N. Y., Gouverneur — Bd. Village Trustees, filtration plant. A. Potter, 50 Church St., New York, consult. engr.

N. Y., Perrysburg — J. N. Adam Memorial Hospital, water supply, incl. dam in Conewango Creek, $250,000. F. K. Wing, Prudential Bldg., Buffalo, architectural engr.

Tenn., Memphis—Bd. Water Comrs., 105-7 North 2nd St., J. Sheahan, genl. supt., 5 mi. 6 in. mains in annexed territory, $32,000.

BIDS ASKED

Ill., Galesburg—See "Contracts Awarded."

Ill., Oak Lawn—July 8, by Bd. Local Impvts., F. E. Harnew, pres., connected system c.i. water main supply pipes in 1st alley north of 95th St., Raymond Ave., 95th St., et al.

Miss., Hattiesburg—July 24, by Bd. Waterworks Comrs., new waterplant on banks Bouie River, incl. filtration plant, aerator, pumping plant, mains, $500,000.

N. Y., Long Island City — July 8, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Woodhaven Blvd., Utopia Parkway, 45th Rd., 65th Pl., 22nd, 24th, 56th, 58th, 70th, 81st, 82nd, and 99th Sts., 38th, 27th, 32nd Aves.

N. Y., New York—July 8, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., removing replacing broken fire hydrants branches.

N. Y., New York — July 8, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains Pelham Bay Parkway, Westchester Esplanade, Palisade, Baychester, Bronxwood, Johnson, Muliner, Netherland, Pearsall, Randall, Seton and Strang Aves., Magneta, Manson, 241st Sts.

N. Y., St. George—July 11, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Jerome Rd., Grandview Terrace Charles, Dongan, Fletcher, Reynolds, Tysen, Wall, Washington and 2nd Sts., Anderson, Barton, Glenwood, Highland, Kimball, Laurel, Meredith, North Railroad Aves.

N. Y., St. George — July 8, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Fort Hill Circle, Seagate Rd., Caldera, Devon, Hooker, LaForge, and Trantor Pls., Abbott and Jefferson Sts., Arlington, Barrett, Blackford, Brentwood, La Forge, Kissel Maryland Aves.

Wash., Walla Walla—July 9, by City Comrs., replacing wooden pipe with 10,000 ft. 20 in. 10-gage steel pipe, $35,000.

CONTRACTS AWARDED

Md., Baltimore — Mayor and City Council, City Hall, mains in Cold Spring Lane, to M. and J. B. McHugh, 3716 Sequoia Ave., $32,439. Noted June 12.

Md., Baltimore—Bd. Awards, City Hall, clearing site Prettyboy Reservoir, to J. A. Lavezza, 911 Eastern Ave., and R. M. Lee, Monkton, $118,808. Noted June 23 Daily.

Md., Baltimore—Bd. Awards, main in Caton Ave., to Ligon & Ligon, 3310 Ridgewood Ave, $33,423. Noted June 5.

Mich., Jackson—For force main from Belden Rd. Pumping Station to western and southern sections, to Jackson Constr. Co., Jackson, $128,678. Noted June 12.

Miss., Gulfport—City Comrs., 11,470 ft. 6 in. c.i. mains, 4 tons fittings, eighteen 6 in. gate valves, 22 fire hydrants, to Hamilton Bros., Gulfport, $12,000. Noted June 5.

Miss., Sledge—City, new mains, extension of lines, to Volz Constr. Co., Baltimore Bldg., Memphis, Tenn., $10,000; artesian well, to Layne Central Co., Chelsea Ave., Memphis, Tenn., $6,000.

N. J., East Orange—Bd. Water Comrs., City Hall, 6 well houses, measuring chambers, to F. LaFerrara, 308 Rhode Island Rd., East Orange, $22,600. Noted May 29.

N. J., West Paterson — Bd. Town Council, mains in Paterson Gardens and Paterson Terrace, to De Frazzo Co., Main St., Hackensack, $26,319.

New York — Bd. Water Supply, 346 Bway., New York, test borings in towns of North Castle, Mount Pleasant and Greenburg and city of Yonkers, Westchester Co., to Osborne Drilling Co., 122 Greenwich St., $50,850. Noted June 5.

N. Y., Long Island City—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Astoria Ave., to L. D. Gregory ,158 26th St., Brooklyn, $16,200; Barnett Ave., to S. Galucci, Railroad Ave., Corona, $5,119. Noted June 19.

N. Y., New York—J. J. Dietz, comr. Water Supply Gas & Electricity, Municipal Bldg., steel mains in Harlem River Speedway, to Oak Hill Contg. Co., Highland Ave., Douglaston, $144,000. Noted June 19.

N. C., High Point—City, erecting 1 m.g. steel water tank, to Chicago Bridge & Iron Wks., 37 West Van Buren St., Chicago, Ill.

O., Cincinnati — Hamilton Co., constructing Water Supply Line 139, Dist. 9, to M. F. Quill, Provident Bank, $92,026 est. $106,556; Water Supply Line 142, Dists. 1, 2, 3, 4, 5, 7 and 9, to Crumley, Jones & Crumley, Temple Bar Bldg., $66,408 est. $80,045. Noted June 23 Daily.

O., Painesville—Lake Co. Comrs., mains to allotments in Willoughby Twp., to W. S. Smith Co., Painesville, $32,947 est. $35,000; 10 mi. mains along Lake Shore Blvd. from here to Willoughby, Mentor Twp., to Abood & Lewis Constr. Co., 626 Huron St., Cleveland, $144,964 est. $150,000. Noted June 5.

Pa., Pittsburgh — Steam turbine driven centrifugal boiler feed pump, appurtenances, for Ross Pumping Station, to Dravo Doyle Co., 302 Penn Ave., $4,635; steam driven air compressor for Herron Hill Pumping Station, to Pennsylvania Pump & Compressor Co., House Bldg., $1,715.

Wash., Kennydale—Water supply, incl. 50,000 gal. tank on timber piling, to A. Del Guzzo, West Auburn, $44,000.

Wyo., Big Piney—New Fork Lake Irrigation Dist., waterworks, to Wilson & Justenson, Laramie, $15,644. Est. $25,000.

SEWERS

PROPOSED WORK

Mo., Overland—For 40 mi. 8 in. to 16 ft. vitr. clay, concrete and rein.-con. sanitary and storm water sewers, disposal plant, $875,000. W. Stoecker, 650 East Big Bend Blvd., Webster Groves, engr.

Mo., St. Louis—Bd. P. Wks., City Hall, improving Cheltenham Sewer Dist. 2, $900; Harlem Creek Sewer Dist. 27, $3,650; Harlem Creek Sewer Dist. 28, $4,425; Southwestern Sewer Dist. 5, $8,700; Rock Creek Sewer Dist. 18, $6,075; Glaise Creek Storm Water Sewer Dist. 30, $9,200. W. W. Horner, city engr.

N. J., Hammonton—Bd. Town Council rejected bids June 9, storm water sewer with appurtenances, $25,000. J. A. Baker, town engr.

N. J., Irvington (br. Newark)—Town Comrs., Town Hall, piping or covering Elizabeth River which flows through the town, $1,000,000. I. J. Casey, Jr., town engr.

N. J., Newark—Bd. City Comrs., City Hall, preliminary plans relocating city dock sewer from City Dock 5 to Route 21 and Green St. $350,000. J. Costello, city engr.

See proposal advertising on page 138

Constr. News page 1

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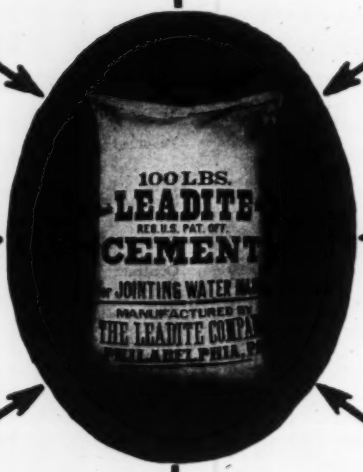

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Sewers (Continued)

N. J., New Brunswick—Bd. City Comrs., City Hall, sanitary sewerage system in Mile-Run. $25,000. A. Athison, city engr.

N. J., Plainfield — Bd. City Council, City Hall, storm water sewer in Cedar Brook Park Ave. to Cedar Brook. $25,000. A. Vars, city engr.

N. Y., Depew—Sewage disposal plant. $140,000. A. Leupold, Depew, engr.

N. Y., Watertown—Completing western outfall sewer, widening Mill St. $400,000.

O., Cincinnati—Hamilton Co. Sanitary Sewer 52, incl. 11,249 ft. 8- to 48-in. vitr. clay pipe, 700 cu.yd. rock trenching. $51,089. J. S. Raffety, Court House, engr.

Okla., Westville—Sewers, disposal plant. $40,000. Benham Eng. Co., 1106 Perrine Bldg., Oklahoma City, engrs.

Tex., Houston—City, c/o W. E. Monteith, mayor, storm and sanitary sewers in Wayside Dr. from Navigation to Harrisburg Blvds., Alabama Ave. from Fannin to Milano Sts., also main sewer line for East Side Sewage Treatment Plant in vicinity Simms Bayou and ship channel. J. M. Nagle, Houston, engr.

Ont., Riverside—Extending sewers, incl. flood gates on St. Paul and Isabella St. Sewers extending sewage pumping station and disposal plant. $40,000. G. G. Reid, Town Hall, engr.

Ont., Windsor—Sewerage system in southeast section city. $115,000. A. Desmara, city engr.

BIDS ASKED

Fla., Miami Beach—July 9, by City, C. W. Tomlinson, clk., 4,581 lin.ft. 15- to 30-in. storm sewers, catch basin connections, 10 yd. concrete, 52 type F catch basins, 30 manholes, 0.6 M. B. M. timber foundation, 10 outfalls, 400 lin.ft. each and 6 in. train tile, 447 cu.yd. broken stone foundation, etc., at Sunset Lake & Nautilus Sub-divisions. E. R. Neff, city engr.

La., New Orleans—Aug. 4, by Sewerage & Water Bd., at office A. G. Moffat, secy., 626 Carondelet St., Contr. 108-D, welded steel pipe, for Drainage Station 9; Contr. 107-S, c.i. pipe and fittings for Sewer Station D.

Ill., Chicago—July 9, by City, at office Bd. Local Impvts., City Hall, tile sewers, brick manholes, catch basins in Lincoln, South Nagle, South Mulligan, South Merrimac, South Melvina, South Moody, South Meade, South McVicker, South Narragansett, South Austin, South Nordica Aves. M. J. Faherty, pres.

Ill., Galesburg — July 22, by Bd. Trustees Galesburg Sanitary Dist., 5,000 ft. 15- to 20-in. vitr. clay tile interceptor sewer. Alvord, Burdick & Howson, 20 North Wacker Dr., Chicago, engrs.

Mass., Boston—July 9, by Dpt. P. Wks., c.i. sewerage works in Roxbury and West Roxbury. $25,000. J. A. Rourke, comr.

Minn., Spring Grove—July 8, by A. A. Thompson, village clk., 15,100 lin.ft. 8- to 12-in. vitr. sewer, Imhoff tank, and Lateral Sewer 1, all in Sewer Project 1. $25,000. Druar & Milinowski, 904 Globe Bldg., St. Paul, engrs.

N. J., East Orange—July 14, by City Council, City Hall, 5100 lin.ft. 8 in. vitr. sewers in Heckel, Eppirt and Chestnut Sts. $25,000. E. Willegerod, city engr.

New York — July 18, by Westchester Co. Sanitary Sewer Comn., E. S. Martin, secy., Court House Annex, White Plains, Sect. W, trunk sewers on Mamaroneck Project, in New Rochelle and Scarsdale; adv. E. N.-R. July 3.

N. Y., Brooklyn—July 9, by H. Hesterberg, pres. Brooklyn Boro, sewers in Mansfield Pl., Farragut and Clarendon Rds., Bedford and Utica Aves., East 26th, East 27th, East 28th and East 29th Sts.

N. Y., Central Islip—July 16, at office Dpt. Mental Hygiene, State Office Bldg., Albany, sewage pumping station, at Central Islip State Hospital. F. W. Parsons, comr.; adv. E. N.-R. July 3.

Okla., Kingfisher—July 14, by M. Crostwait, city clk., 12,293 ft. 8 in. concrete lateral sewers in Dist. 12. $25,000. C. R. Steele, Kingfisher, engrs.

Okla., Nichols Hills (P. O. Oklahoma City)—July 7, by T. A. Montague, town clk., sanitary lateral sewers, in Dist. 1, $75,000; main lateral sewers, $50,000; storm sewers, $75,000. Former bids rejected. Benham Eng. Co., Perrine Bldg., Oklahoma City, engrs. Noted June 19.

Okla., Tulsa—July 8, by City Comn., Storm Sewer Project 9-D-30, section Cat Creek Relief Storm Sewer along Archer St. and Cincinnati Ave. $26,090. H. A. Parker, city engr.

Ore., Salem—City Council bids about Sept. 1, sewer in district east of Mill Creek. $45,000. R. M. Rogers, city engr.

CONTRACTS AWARDED

Calif., Los Angeles—Los Angeles Co., sewer in Main St., Sanitation Dist. 8, to R. A. Watson, 1026 North McCadden Pl., $97,210.

Ill., Chicago—Bd. Local Impvts., City Hall, tile sewers, brick manholes, catch basins in East 92nd Pl., South Natoma and South Neenah Aves., to O. Scully Co., 7658 Laflin St.; Hamlet, South Rutherford and South Normandy Aves., to C. Fosco, 908 South Irving Ave.

Ill., Chicago—Bd. Local Impvts., City Hall, brick sewers, brick manholes in West 43rd St., tile sewers, brick manholes, catch basins in South Nashville and South Natches Aves., to A. Scully, 4504 Wrightwood Ave.; South Rutherford, South Oak Park, South Newcastle, South New England, and Archer Aves., to F. Peyrot, 4309 North Mason St.

Md., Baltimore — Mayor and Bd. Awards, sanitary sewers, storm drains in Storm Water Contr. 58, to Aiello Contg. Co., Gough and Dean Sts. $144,402; in Storm Water Contr. 151, to N. Martell, 4400 Vesta Ave., $27,704. Noted June 23 Daily.

Mass., Boston — City, Dpt. P. Wks., c.i. sewerage works in Hyde Park Ave., Hyde Park, to J. Williams, 8 Beechwood St., Dorchester, $31,831. Noted June 5.

La., New Orleans—Sewerage & Water Bd., 526 Carondolet St., Contr. 114-D, extensions to Drainage Pumping Station 3, to J. Riess, New Orleans Bank Bldg., $138,550; two 110 in. new screw pumps for Drainage Station 9, to Fulton Iron Wks., 1259 Delaware St., St. Louis, Mo., $25,500; wire and cable, to Grayson Electric Co., 601 South Peters St, $8,053. Grand total $172,103. Noted May 15.

Neb., Omaha—Sewers in Storm Sewer Contr. 1060, Center St. from 56th to 60th Sts., to Humphreys Bros., 408 Securities Bldg., $146,810.

N. J., Lodi—Bd. Boro Council, Boro Hall, 30 in. c.i. trunk sewer in South Main St., et al., laterals, to Maggi Schoonover Co., 9 Colt St., Paterson, $25,681; pump house, heating, plumbing, to F. J. Wright Co., 45 Church St., Paterson, $6,467. Noted June 5.

N. Y., New York—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., sewers in Kearney Ave., to Anita Constr. Co., 410 200th St., $6,303; Mace Ave., to C. Turiano, 2913 Coddington Ave., $9,108. Noted June 19.

O., Akron — Force mains, supplementary sewers in Hawkins Ave., to F. George, Mahoning Bank Bldg., Youngstown, $35,919. Est. $35,000.

O., Cincinnati — For 8,695 ft. 8- to 27-in. vitr. clay sanitary sewers in Reading Rd. between point 700 ft. north of Sherman and point 2,640 ft. north Bella Vista, to O'Connell & Sweeney, Kellogg and Tennyson Sts., $36,651. Est. $46,952.

Okla., Fletcher—For 19,200 ft. 6- to 10-in. concrete sanitary sewerage system, to Highway Constr. Co., Daniels Bldg., Tulsa, $26,100. Est. $27,000.

Okla., Oklahoma City — Sanitary lateral sewers in Capitol Courts Addition, to H. B. Derr, 200 East Main St., Oklahoma City, $43,520. Est. $45,000.

R. I., Providence—Bd. Contr. & Supply, c.i. sewerage works, in Sawyer, Mattie and Melissa Sts., to I. Capaldi, 270 Mt. Pleasant Ave.; in Harmony Dr. and College Rd., to W. A. Ganmino, Inc., 250 Hartford Ave. Est. $25,000.

Ont., Forest Hill—L. W. Archer, village clk., 41 Spadena Rd., Toronto, concrete trunk sewer in Eglinton Ave., to Worthington Constr. Co. Ltd., 23 Strathearn Blvd., Toronto, $60,001; lateral sewers in Elmthorpe Blvd., Ava Rd. and Vesta Dr., to F. C. Moreno, 1 Orchard Park Blvd., Toronto, $6,700; supplying pipe, to Independent Concrete Co. Ltd., 400 Cheyne Ave., Toronto. Noted May 22.

WASTE DISPOSAL

PROPOSED WORK

Pa., Erie—City, M. J. Henry, clk., bids this summer, garbage and rubbish disposal plant. $150,000. Private plans. Noted Dec. 19.

BIDS ASKED

Wis., Milwaukee—July 8, by Dpt. P. Wks., City Hall, 3 story, 43 x 127 ft., brick, steel, rein.-con., incinerator, 150 ft. stack. Erie St. $125,000. C. Malig, city engr.

CONTRACTS AWARDED

O., Lakewood—City, E. A. Wiegand, dir., 1 story, brick, steel, garbage incinerator, to Pittsburgh-Des Moines Co., Tuttle and Southwest 10th Sts., Des Moines, Ia., $77,235. Noted May 1.

BRIDGES

PROPOSED WORK

Ark., Prescott—State Hy. Comn., Little Rock, preliminary plans 3 steel fixed span bridge over Little Missouri River, near here.

Ind., Laporte—Bd. Comrs. Laporte Co., bridge, $200,000. F. A. Hausheer, Laporte, co. aud.

Maine—Canadian Pacific Ry. Co., J. H. R. Fairbairn, ch. engr., Montreal, Que., Canada, rebuilding 2 bridges at Greenville and Brownsville Junction. To exceed $25,000.

Mass., Kingston—New York, New Haven & Hartford R.R., R. L. Pearson, ch. engr., New Haven, Conn., reconstructing and constructing addition Howland's Lane Bridge. $25,000.

Mass., Scituate—Town, Bd. Selectmen, concrete, steel bridge, Foster Rd. $35,000. Fay, Spofford & Thorndike, 44 School St., Boston, engrs.

Ont., Hamilton—Longwood Bridge, 100 ft. long, 40 ft. wide, Canal Bridge, 80 ft. span and two 53 ft. approaches, concrete, steel. W. L. McPaul, city engr.

BIDS ASKED

Calif., Riverton—July 16, by C. H. Purcell, engr. State Hy. Comn., Sacramento, one 60 ft. and two 54 ft. rein.-con. deck girder span bridge on concrete piers and bents over South Fork of American River, El Dorado Co.

Calif., Roverton—July 16, by State Hy. Comn., Sacramento, one 60 ft. and two 54 ft. span rein.-con. deck girder bridge on concrete piers, bents, grading, untreated crushed gravel or stone surfacing approaches, El Dorado Co. C. H. Purcell, hy. engr.

Iowa—July 8, by State Hy. Comn., Ames, 30 ft. concrete arch, 70 x 20 ft. pony truss with two 28 x 20 ft. I-beam approach spans, 80 x 20 ft. deck truss, 40 x 20 ft. and three 36 x 20 ft. I-beam approach spans, 50 x 20 ft. pony truss bridges, Rd. 3, B-524, Decatur Co.—90 x 20 ft. pony truss bridge, 8 culverts, extensions, Rd. 54, B-669, Floyd Co.—90 x 20 ft. pony truss bridge with two 32 x 20 ft. I-beam approach spans, 11 culverts, extensions, Rd. 25, B-647, Guthrie Co.—widening 20 ft. concrete arch bridge, one 32 x 24 ft. and one 40 x 24 ft. I-beam bridges, 13 culverts, extensions, Rd. 15, F. A. B. 139, Hancock Co.—120 x 20 ft. high truss bridge with four 40 x 20 ft. I-beam approach spans, 80 x 20 ft. pony truss bridge with two 40 x 20 ft. I-beam approach spans, Rd. 3, B-467, Lee Co.—40 x 24 ft. I-beam bridge, 29 culverts, extensions, Rd. 13, F. A. B. 230, Linn Co.—adding two 40 x 20 ft. I-beam spans on creosoted piling to 140 x 20 ft. high truss bridge, adding two 40 x 20 ft. deck girders to overhead crossing, Rd. 71, F. A. B. 238, Montgomery Co.—raising 24 x 20 ft. I-beam bridge, 22 culverts, extensions, Rd. 66, B-327, Wayne Co.—3 culverts, Rd. 171, B-694, Wright Co.—6 culverts, extensions, Rd. 54, B-669, Floyd Co. R. F. White, hy. engr.

Me., Bucksport—July 29, by Directors Waldo-Hancock Bridge, F. A. Peabody, chn., c/o L. D. Barrows, ch. engr. State Hy. Comn., Augusta, substructure Waldo-Hancock Bridge over Penobscot River, near here. Robinson & Steinman, 117 Liberty St., New York, consult. engrs.; adv. E. N.-R. July 3. Noted May 15 under "Maine."

Minnesota and Wisconsin—July 22, by Wisconsin Hy. Comn. and Commissioner Hys. Minnesota, 1246 University Ave., St. Paul, Minn., constructing Stillwater Bridge, S. T. H. 64, Wisconsin Div. Job 6031, Minnesota State Project 45-23 (Bridge 4654).

Miss., Natchez — July 8, by Bd. Supervs. Adams Co., reconstructing and 2 additions to bridge over St. Catherine Bayou on Lower Natchez-Woodville Rd., incl. 44,000 lb. reinforcing and 35,000 lb. structural steel, 1,504 lin.ft. timber foundation piling. W. H. Hale, chancery clk.

Miss., Senatobia — July 7, by Bd. Supervs. Tate Co., two 80 ft. span steel truss bridges, 12 ft. roadways over canal at different points.

Mo., St. Louis — July 29, by Bd. P. Serv., City Hall, rein.-con. bridge over River Des Peres, Lansdowne Ave. $109,400. L. R. Bowen, city engr. Noted May 22.

N. J., Newark—July 8, by Essex Co. Park Comn., 115 Clifton Ave., 2 rein.-con. bridges and 6,000 lin.ft. concrete revetment walls. $25,000. A. B. Cohen, 1 Madison Ave., New York, consult engr.

N. Y., Tonawanda—July 8, by W. G. Hickman 29 County Hall, Buffalo, 125 ft., 3 span concrete steel bridge, 40 ft. roadway, 2 sidewalks over Ellicott Creek, on Delaware Ave.

Pa., Johnstown—City, G. W. Griffith, supt., taking bids Contr. 3007, McMillan St. Bridge, 18 ft. concrete span, 60 ft. wide, 24 ft. roadday, 208 ft. sidewalks—Contr. 3012, Cherry Run Culvert, 7 ft. span 56 ft. wide, Lorain St. —Contr. 3008, grading, concrete paving 1,187 sq.yd. Cook St., Dorothy Aves.—Contr. 3009, 362 ft. J St. and Barron Ave.—Contr. 3010, 102 sq.yd. Glitch Alley—Contr. 3011, 181 sq.yd. Roberts Alley. H. L. Wilson, City Bldg., engr.

West Virginia—See "Streets and Roads."

CONTRACTS AWARDED

Illinois—State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, bridges in Bureau Co., to Mass & Balmes Constr. Co., Barrington, $22,487—Bureau Co., to Continental Bridge Co., 460 Monadnock Bldg., Chicago, $17,990—Cook Co., to L. B. Fugitt Constr. Co. 307 North Michigan Ave., Chicago, $77,087. Grand total $177,564. Noted May 1.

Ind., Logansport—Cass Co. 4 span 441 ft. rein.-con. bridge, 54 ft. over Eel River, to National Concrete Co., 1017 Lemcke B., Indianapolis, $71,000. Est. $117,193. Noted June 5.

Iowa—State Hy. Comn., Ames, bridges, culverts in Cass Co., to F. O. Akin, Corning, $96,970—Crawford and Guthrie Counties, to Kelley & Overman, Villisca, $1,181 and $2,800 respectively—Crawford and Mehaska Counties, to A. Olson Constr. Co., Waterloo, $9,850 and $30,100 respectively—Page Co., to G. R. Yegge, Boone, $13,500—culverts in Audubon Co., to J. P. Conway, Boone, $641—Marion Co., to H. T. Stillman, Ames, $4,950. Grand total $159,992. Noted June 19.

Michigan — Macomb Co. Rd. Comn., Mt. Clemens, R. Br. 1 of 50, 4-23, two 60 ft. span steel deck girder Contr. C-1, to Bethlehem Steel Co., Oliver Bldg., Pittsburgh, Pa., $3,898; Contr. C-2, to L. A. Davison, Birmingham, $21,606. Noted May 8.

Mississippi — State Hy. Comn., Jackson, 3 treated timber bridges on East West Rd. through Raleigh, Smith Co., to H. C. Anderson & Son, Raleigh, $30,000.

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Bridges (Continued)

Minn., St. Paul—K. L. Fieseler, city purch. agt., rein.-con. viaduct, Hastings Ave., at Johnson Parkway, to Lovering-Longbotham Co., 605 Builders Exch. Bldg., $32,694. Noted May 22.

N. H., Concord—City and Boston & Maine R.R., W. J. Backes, ch. engr., Boston, Mass., reconstructing steel, timber bridge over railroad tracks, at Bridge St., to Eastern State Bridge Building Co., 77 Pleasant St. Est. $60,000. Noted June 20, 1929.

New Jersey—State Hy. Comn., Trenton, bridge in Cape May Co., to Triest & Earle, Inc., Real Estate Trust Bldg., Phila., Pa., $44,829. Noted May 22.

N. J., Elizabeth—Bd. Freeholders Union Co., Court House, steel, concrete bridge on Hamilton St., in Rahway, and bridge on Cooper Ave., Scotch Plains, to J. F. Chapman & Son, Inc., Hillside, $23,848 and $2,563 respectively—deck on West Jersey Bridge, to H. E. Terrill, $12,910. Grand total $39,321.

Pennsylvania—See "Streets and Roads."

Va., Petersburg—Seaboard Air Line Ry. Co., Petersburg, concrete, steel bridge over Appomattox River, concrete work, to Cornell-Young Co., Macon, Ga.; steel work, to Amer. Bridge Co., 71 Bway., New York. Est. $750,000.

Vt., Marshfield—State Hy. Dpt., Montpelier, 50 ft. concrete T-beam bridge, with 5 ft. concrete sidewalks, abutments over Winooski River. Owner builds. Noted June 5.

Washington—S. J. Humes, dir. State Hys., Olympia, rein.-con., abutments, piers and footings for Prosser Bridge, over Yakima River, on Route 3, Benton Co., to MacRae Bros., 614 5th Ave., Seattle, $83,070. Noted Apr. 24.

Wis., Merrill — State and Lincoln Co. Hy. Comns., Court House, Merrill Bridge (Center Ave. Bridge-Merrill Overhead and approaches) Projects 7830 and 7847, to Stevens Bros., 612 Endicott Bldg., St. Paul, Minn., $139,848. Noted June 5.

STREETS AND ROADS

BIDS ASKED

Ark., Russellville—Bids probably in July, concrete resurfacing 2 mi. Street Impvt. Dist. 11 (Main St.). $49,635. S. C. Davies, Russellville, engr.

California—July 16, by C. H. Purcell, engr. State Hy. Comn., Sacramento, grading, untreated crushed gravel or stone surfacing 1.4 mi. Alturas Rd., Modoc Co.—oil treated crushed gravel or stone surfacing 13.9 mi. Cottonwood Creek-Democrat Springs Rd., Kern Co.—grading, asphaltic concrete paving 1.4 mi. Forest Lake Rd., San Joaquin Co.

Calif., Eureka—Bd. Supervs. Humboldt Co., bids about July 15, emulsified asphalt surfacing 25 mi. roads.

Idaho—July 10, by J. D. Wood, comr. P. Wks., grading, bridging, crushed gravel surfacing 15.790 mi. Lewis and Clark Hy., Nez Perce and Clear bridge on water Counties, J. J. McGreedy, Lewiston, dist. engr. — grading, crushed rock surfacing 6.594 mi. Palouse Hy., Benewah Co.; 6.98 mi. Palouse Hy., Kootenai Co.; grading, bituminous surfacing 5.541 mi. Heyburn Park Hy., Benewah Co., C. J. Chaffins, Coeur d'Alene, dist. engr.—grading, concrete bridge on 8.025 mi. Idaho-Montana Hy., Jefferson Co.; grading, graveling 11.818 mi. Roosevelt Hy., grading 1.485 mi. Roosevelt Hy., Rainey Creek Extension, P. B. Wilson, Pocatello, dist. engr.

Illinois — July 9, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, grading 11.02 mi. Route 146, Sect. 106-A, Union Co. F. T. Sheets, ch. hy. engr.

Ind., Bloomington — July 8, by Bd. Comrs. Monroe Co., Court House, grading, crushed stone surfacing 11.615 ft. Michael Chitwood Rd., Benton Twp., $19,000; 7.375 ft. Burch Rd., Creek Twp., $12,968. A. Eller, co. clk.

Ind., Decatur—July 8, by Bd. Comrs. Adams Co., at office A. Harlow, aud., improving A. N. Springer Rd., Monroe Twp., $29,158; Henry Graber Rd., Washington Twp., $24,811.

Ind., Lawrenceburg—July 7, by Bd. Comrs. Dearborn Co., macadam surfacing Otis Nowlin Rd. $25,105. B. McLeaster, Lawrenceburg, aud.

Ind., Peru—July 9, by Bd. Comrs. Miami Co., graveling 10.496 ft. J. O. Russell Rd., $9,350—11,985 ft. Rd. 17, $10,130—17,795 ft. Rd. 8, $9,930. G. Hostetler, Peru, aud.

Ind., Princeton—July 8, by Bd. Comrs. Gibson Co., concrete paving Lottie Yeager and Orns Westfield Rds. $28,232. S. G. Marshall, Princeton, aud.

Ind., Rensselaer—July 7, by Bd. Comrs. Jasper Co., improving Alex Hurley and Eugene Kirk et al. Rds., Barkley Twp. K. T. Allman, co. aud.

Iowa—July 8, by State Hy. Comn., Ames, grading, flumes, paving 3.183 mi. P-668 and 6.507 mi. P-669, Floyd Co.—11.429 mi. P-646 and 2.962 mi. P-647, Guthrie Co.—0.483 mi. P-694, Wright Co.—graveling 10.98 mi. P-585-ABCDE, Clayton Co.—1.353 mi. P-506, Clark Co.—5.824 mi. P-502, Adams Co.—1.088 mi. P-362, Taylor Co.—second course graveling 6.771 mi. P-200-B, Wright Co. R. F. White, hy. engr.

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Ia., Marshalltown—July 9, at office Auditor Marshall Co., graveling 14.65 mi. trunk roads; grading 0.59 mi. trunk roads.

Kan., Topeka—July 8, by City Clerk, grading, 6 and 8 in. concrete paving 12 blocks alleys, and 20 blocks streets. W. E. Baldry, City Hall, engr.

Louisiana — July 8, by State Hy. Comn., Baton Rouge, grading, roads in West Carroll and East Feliciana Parishes; surface treating roads in St. Tammany Parish. H. B. Henderlite, hy. engr.

Louisiana — July 15, by State Hy. Comn., Baton Rouge, grading, drainage structures 6.6 mi. Project 739-A, Route 109. H. B. Henderlite, hy. engr.

Maryland — July 8, by State Roads Comn., Baltimore, concrete or penetration macadam paving 0.91 mi. Harford Co.—concrete shoulders on 3.22 mi. Harford Co.—0.58 mi. Montgomery Co.—5.34 mi. St. Mary's Co.—0.25 mi. Worcester Co.—hot or cold bituminous mixture resurfacing 1.2 mi. Montgomery Co.—gravel surfacing 7.63 mi. Prince George's Co.—penetration macadam paving 0.58 mi. Queen Annes Co. G. C. Uhl, chn.; adv. E. N.-R. July 3.

Massachusetts — July 8, by Dpt. P. Wks., State House, Boston, rein.-con. and bituminous macadam (dual type) paving 23,405 ft. hy. in Randolph, Quincy and Milton. A. W. Dean, Dpt. P. Wks., Boston, engr.

Massachusetts—July 8, by Dpt. P. Wks., Boston, bituminous macadam paving 34,120 ft. hys. in Norton, Whately, Marlborough, Gardner, Boxford and Topsfield. A. W. Dean, Dpt. P. Wks., Boston, engr.

Mass., Boston—July 8, by Dpt. P. Wks., J. A. Rourke, comr., sheet asphalt or bitulithic paving Eustis St., West Roxbury. $25,000.

Mass., Chelsea (br. Boston)—See "Contracts Awarded."

Michigan—July 8, by H. C. Fleming, resident engr., Grand Rapids, grading, shaping, draining, concrete paving 0.33 mi. MO70-17-Contr. 4, Ottawa Co., 18 ft., for State Hy. Comn., Lansing.

Miss., Canton—July 8, by Madison Co. Hy. Comn., Road Dist. 1, graveling 8 mi. Road Dist. 1. W. H. Bradley, Canton, engr.

Miss., Canton—July 8, by Bd. Comrs. Madison Co., grading, graveling 8 mi. Road Dist. 1. W. H. Bradley, Court House, engr.

Miss., Walthall — July 7, by Bd. Comrs. Separate Road Dist. 4, Webster Co., graveling 6.5 mi. Tomnoten-Greensbar Hy., Project 5; 4.5 mi. Clarkson-Emporia Hy. W. S. Lindsley, Emporia, co. engr.

Miss., Walthall—July 7, by Bd. Comrs. Webster Co., graveling 9 mi. Project 3—4 mi. Project 2—10 mi. Walthall-Montevista Hy.

Mo., Clayton—July 9, by Court St. Louis Co., 4 and 8 in. waterbound macadam paving 1,415 ft. Scenic Dr.—rein.-con. paving 489 ft. Lincoln Ave.; concrete sidewalks 580 ft. South Milton Ave.; replacing old bridge with 5 x 3 ft. concrete box culvert along Dade Ave. R. Jablonsky, Court House, co. engr.

Mo., Clayton—July 9, by St. Louis Co., concrete paving 4,331 ft. Maryland Ave.—3,692 ft. Ladue Rd.—3,238 ft. Dalmar Blvd.—2.4 mi. Big Bend Blvd. R. Jablonsky, Court House, co. engr.

Neb., Adams—July 10, by R. B. Winter, village clk., waterworks. $27,100. Henningson Eng. Co., 326-30 Union State Bank Bldg., Omaha, engrs.

N. Y., Brooklyn—July 9, by H. Hesterberg, pres. Brooklyn Boro. Boro Hall, grading Fillmore Ave.; grading, curbing, asphalt on 6 in. concrete paving Carroll, Kimball and Lorimer Sts.

N. Y., Newark—July 16, at office Dpt. Mental Hygiene, State Office Bldg., Albany, guttering at Newark State School, Wayne Co. F. W. Parsons, comr.

N. Y., New York—July 9, by J. Miller, pres. Manhattan Boro. Municipal Bldg., grading, 4 in. granite block repaving Broome St.; grading, sheet asphalt on concrete repaving 5th Ave.

N. Y., St. George—July 9, by J. A. Lynch, pres. Richmond Boro; Boro Hall, concrete repaving Rockland Ave.

Okla., Bartlesville—July 10, by W. K. Blockly, city clk., grading, concrete paving 15,000 sq.yd. $48,000. J. E. McCormick, Bartlesville, engr.

Okla., Minco—July 7, by L. Benda, city clk., grading, 6 in. concrete paving 9,250 sq.yd. Main St. $31,000. Long & Co., 1300 Colcord Bldg., Oklahoma City, engrs.

Pennsylvania—July 10, by State Hy. Dpt., Harrisburg, constructing 41 mi. roads in Adams, Armstrong, Berks, Cambria, Centre, Clinton, Dauphin, Lebanon, Fayette, Greene, Huntingdon, McKean, Mercer, Crawford, Northumberland, Potter, Snyder and Juniata Counties. J. L. Stuart, secy.; adv. E. N.-R. July 3.

Pa., Phila.—July 8, by Dpt. P. Wks., Bureau Hys., City Hall Annex, A. Murdock, dir., grading—asphalt paving (assessment work) — redressed granite block repaving—country road improving.

Pa., Phila.—July 9, by Dpt. P. Wks., Bureau Eng. & Surveys, A. Murdock, dir., City Hall Annex, Schedule A—Manayunk Elevated Contr. 104, grading paving, sewers.

Pa., Southmount (P. O. Johnstown) — July 14, by H. Munzer, secy. Municipal Bldg., grading, paving 1,200 ft. Theburn, Daisy and Queen Sts., 24 and 36 ft. $25,000. S. E. Dickey, Johnstown Trade Bldg., Johnstown, engr.

R. I., Providence—July 7, by Bd. Contr. & Supply, City Hall, sheet asphalt or bituminous macadam paving Eddy St. $25,000.

Tennessee—July 18, by State Dpt. Hys. & P. Wks., Nashville, **(F. A. P. means Federal Aid Project and S. A. P. State Aid Project)**, paving 10.440 mi. State Hy. 2, also paving approaches to bridges at Jasper and near Kimball, S. A. P. 137-C-S and 170-C-S and F. A. P. 240-A, Marion Co.—8.278 mi. State Hy. 20, F. A. P. 235-A, Madison Co.—11.233 mi. State Hy. 100, F. A. P. 236-C, Williamson Co.—grading 7 mi. State Hy. 74, S. A. P. 301-C, Polk Co.—6 mi. State Hy. 13, S. A. P. 550-A, Sequitchie Co.—3 mi. State Hy. 51, S. A. P. 551-A, Macon Co.—concrete bridge over Briar Fork Creek near Tate Springs, S. A. P. 14-A, Grainger Co.—5 timber bridges on State Hy. 76, S. A. P. 540-A, Fayette Co. R. H. Baker, hy. engr.

Virginia—July 15, by State Hy. Dpt., Richmond, clearing, grubbing, grading, macadam surfacing 5 mi. Route 815, Project S-628-ABD, Page Co.—clearing, grubbing, grading, macadam or concrete surfacing 3 mi. Route 14, Project F-647, Bedford Co.—clearing, grubbing, grading, concrete surfacing 2.5 mi. Route 503, Project S-652-A, Norfolk and Nansemond Counties—30 ft. span concrete bridge Route 31, Project S-79-B1, and 30 ft. span concrete bridge Route 31, Project S-79-B2, Prince William Co. H. J. Spellman, ch. engr.; adv. E. N.-R. July 3.

West Virginia — July 22, by State Roads Comn., Charleston, retread surfacing 2.7 mi. St. Albans-Coal Mountain Rd., Kanawha Co.—widening, retread surfacing 2.7 mi. Charles Town-Daily Bridge Rd., Jefferson Co.—widening, concrete surfacing 1 mi. Kanawha City-Garnet Rd., Kanawha Co.—1.8 mi. Harpers Ferry-Bolivar Rd., Jefferson Co.—concrete surfacing 13 mi. Barboursville-Culloden Rd. Cabell Co.—bituminous macadam, modified bituminous macadam and retread surfacing 5 mi. Racine-Drawdy Creek Rd., Boone Co.—gravel surfacing 8 mi. Wileyville-Sugar Run Rd., Wetzel Co.—grading 3 mi. Redhouse-Paradise Rd., Putnam Co.—grading, bituminous surfacing 7 mi. Wilson-Lewisburg Rd., Greensbrier Co.—grading, concrete paving 1.2 mi. Moorefield-Oldsfield Rd., Hardy Co.—cold tar surface treatment 9 mi. Rock Camp-Peterson Rd., Monroe Co.—0.6 mi. culvert and fill Garnett Creek Rd., Wayne Co.—rock fill on Davin-Wyoming Co. Rd., Logan Co.—wire rope guard rail along Northwestern Turnpike, Doddridge, Harrison and Taylor Counties—storm sewer in Weirton, Hancock Co.—Maysville Bridge 1224, three 26 ft. spans, concrete, Grant Co.—Little Beaver Creek Bridge 1218, 40 ft. concrete extension, Raleigh Co.—Dan Run Bridge 1204, 60 ft. concrete arch span, Ritchie Co.—Bridge 1186 over Gorrell Run, 20 ft. concrete arch span, Tyler Co.

W. Va., Charleston—July 8, by Bd. Comrs. Kanawha County Court concrete paving 6 mi. Cabin Creek Rd., 16 ft. C. M. Ross, Court House, co. road engr.

Wisconsin—July 7, by G. I. Germond, divisional state hy. engr., Superior, graveling, 3 mi. extension Hy. 13, north of Washburn—4 mi. Hy. 2 from Ashland Junction to Ashland—grading, filling in 3,000 ft. swamp near Rice Lake—construction overhead timber bridge on Hy. 8, Polk Co.

Wisconsin—July 8, by State and Barron, Ashland, Bayfield and Polk Co. Hys. Comns., Telegram Bldg., Superior, graveling 0.57 mi. Cameron-Rice Lake Rd., U. S. Hy. 53, F.A.P. 185, Reopened — 1.038 mi. Superior-Ashland Rd., U. S. Hy. 2, Federal A.P. 375-C—2.639 mi. Superior-Ashland Rd., U. S. Hy. 2, F.A.P. 375-D—3.6 mi. Washburn-Bayfield Rd., S.T.H. 13, S.A.P. 8344—also Jefferson Street Bridge, U. S. Hy. 8, F.A.P. 408-D.

Wisconsin—July 8, by State and Jackson and Monroe County Hy. Comns., Court House, La Crosse, concrete paving 5.53 mi. Black River Falls-Millston Rd., U. S. Hy. 12 F.A.P. 214, also constructing Tomah Bridges 1 and 2.

Wisconsin—July 9, by State and Walworth Co. Hy. Comns., Court House, Elkhorn, grading, concrete paving 4.295 mi. Delavan-Lake Geneva Rd., S. T. H. 50, S. A. P. 2922—1.15 mi. Sharon-Darien Rd., C. T. H. C. Co. Aid Project 2942—1.544 mi. Walworth Co. Farm Rd., C. A. P. 2943—0.35 mi. Hartwell Relocation, S. T. H. 14, C. A. P. 2981.

Wisconsin—July 10, by State and Dodge Co. Hy. Comns., Court House, Juneau, concrete surfacing 53.227 sq.yd. Mayville-LeRoy Rd., C. T. Hy. Y, C. A. P. 1290.

Wisconsin—July 11, by State and Grant and Richland Counties Hy. Comn., grading, concrete paving 0.67 mi. Preston-Montfort and Fountain St., Montford, U. S. Hy. 18 and Fountain St. S. A. P. 9237 and 9283—0.642 mi. Richland Center-Bosstown Rd., S. T. H. 11, S. A. P. 9350 — grading 0.63 mi. Bloomington-Patch Grove Rd. extension, S. T. H. 35, S. A. P. 9346—constructing British Hollow Bridge, U. S. Hy. 61, C. A. P. 9390—Hichok Bridge, S. T. H. 35, S. A. P. 9346.

Wis., Superior—E. B. Banks, city engr., taking bids concrete paving 2.5 mi. Bardon Ave. to connect with Tower Ave. $140,000.

Wyoming—July 8, by State Hy. Comn., Capitol Bldg., Cheyenne, gravel surfacing 2.16 mi. Worland-Tensleep Rd., and 11.074 mi. Worland-Greybull Rd., Washakie Co.—surfacing 14.799 mi. Cheyenne-Torrington Rd., Goshen Co. — grading 0.539 mi. Kemmerer-Big Piney Rd., Sublette Co.—11.944 mi. Node-Van Tassel Rd., Niobrara Co.—13.554 mi. Riverton-Hudson Rd.,

Streets and Roads (Continued)

Fremont Co.—2.369 mi. Laramie-Buford Rd., Albany Co.—5.725 mi. Granger-Lyman Rd., Union Co.

Ont., Hamilton—See "Contracts Awarded."

Ont., Sault Ste. Marie—City soon takes bids concrete paving 40,000 sq.yd. $125,000. A. H. Russell, City Hall, engr.

CONTRACTS AWARDED

Ark., Camden—Concrete paving South Adams and Beckenridge Sts., to Grady Garms Constr. Co., 701 Rector Bldg., Little Rock, $38,100.

Ark., Conway—Widening, warrenite paving 2 mi. Paving Dist. 18, to Hogan Constr. Co., Little Rock, $95,826. Noted June 5.

Calif., Glendale — Grading, walks, curbing, guttering, asphaltic concrete paving 8th St., Hillcrest Ave. et al., to Atkinson & Reish, 1241 Ethel St., Glendale, $32,206. Noted May 22.

Calif., Los Angeles—Improving Venice Blvd., to G. R. Curtis Paving Co., 2440 East 26th St., $25,949.

Calif., Los Angeles—Los Angeles Co., grading, curbing, guttering 3 in. oil macadam surfacing 171,000 sq.ft. Castle Rd., to A. O. Nelson, 126 North Huntington Dr., Pasadena, $27,230. Noted May 22.

Calif., San Rafael—Bd. Supervs. Marin Co., emulsified asphalt paving 230,000 sq.ft. Lower Novato-Black Point Rd., to Highway Builders, Inc., 640 Redhill Ave., San Anselmo, at $0.02 per sq.ft. Noted May 29.

Conn., Bridgeport—Sheet asphalt paving 22,000 sq.yd. Capital Ave., Bishop and Main Sts., to Silliman & Godfrey Co., 133 Admiral St., $63,020—13,560 sq.yd. Hayes, Cortland, Midland, Atwater, Lorraine, Remington and Sage Sts., to Leverty & Hurley Co., 500 Waterview Ave., $28,179—penetration asphalt paving 16,520 sq.yd. Hicks, Joseph, Shelton, Ogden, Helen, Holly and Morehouse Sts., to Bridgeport Constr. Co., 35 Milne St., $28,219. Grand total $119,418.

Illinois — State Dpt .P. Wks. & Buildings, Div. Hys., Springfield, grading roads in Cook Co., to D. Longo, Chicago, $41,170 — paving Cook Co., to I. D. Lain Co., Park Ridge, $57,845—Morgan Co., to Cast Stone Constr. Co., Bloomington, $151,823 — Douglas and Edgar Counties, to J. Kesl & Sons, Edwardsville, $444,304—Hamilton and Saline Counties, to Dungey & Cochran, Marion, $58,870—Hamilton and Jefferson Counties, to J. R. Feigel Co., Evansville, Ind., $197,740—Wayne and White Counties, to C. J. Moritz, Inc., Effingham, $279,352—Randolph and Perry Counties, to Hamilton Constr. Co., Carbondale, $61,281. Grand total $1,292,385. Noted May 1.

Ill., Chicago—Bd. Local Impvts., City Hall, grading, curbing, guttering, sewers, 8 in. concrete paving Lemont, Keene, Granville and Sauganash Aves., to Marquette Constr. Co., 5726 North Winchester St. Noted June 5.

Ill., Chicago—Bd. Local Impvts., City Hall, grading, 7 in. concrete paving 2 alleys, to P. J. O'Brien & Co., 4 North Cicero Ave.—grading, curbing, guttering, sewers, 8 in. concrete paving South Kostner Ave., to Hedges Constr. Co., 64 West Randolph St.—Moody Ave., to Home Paving Co., 134 North La Salle St.—grading, curbing, sewers, 8- to 10-in. concrete paving Torrence Ave., to Farr Bros. Co., 356 West 111th St.—Trumbull Ave., to Central Paving Co., 179 Washington St.—grading, removing old curb and gutter, sewers, curbing, guttering asphalt on 8 in. concrete and granite block on sand paving West 71st St., to Amer. Asphalt Paving Co., 133 West Washington St.—grading curbing, guttering, sewers, asphalt on 6 in. concrete paving Ignatius St., South Laramie, North Leclaire, North Linder, North Neva, Nixon, Hayes and Schreiber Aves., to White Paving Co., 1735 Fullerton Ave. Noted June 12.

Indiana — Elkhart Co. (Goshen), Kosciusko Co. (Warsaw) and Marshall Co. (Plymouth), concrete surfacing Hickman Rd., to I. G. Johnson, Lynn, $40,000. Noted June 5.

Ind., Anderson — Madison Co. concrete surfacing 2 mi. Cooper Rd., to Daniels & McVaugh, Anderson, $63,700 est. $66,000—1 mi. Cross St., to L. Burke, Anderson, $28,000 est. $30,000—4.25 mi. Cartwright Rd., to W. J. Neece Co., $107,643 est. $130,000. Grand total $199,343. Noted June 12.

Ind., Bloomington—Monroe Co., concrete surfacing 4,980 ft. James Cirgin Rd., to Kerr & Murphy, Bloomington, $32,592. Est. $35,620. Noted May 22.

Ind., Rockville—Parke Co., concrete surfacing 1 mi. Montezuma Rd., to C. W. Bridges, Coatesville, $23,654. Est. $28,593. Noted May 22.

Ind., South Bend—July 7, by Bd. Comrs. St. Joseph Co., concrete surfacing F. H. Wellington Rd., $62,900—R. C. Stephenson Rd., $46,100—Frank Rogers Rd., $11,500. F. P. Crowe, South Bend, co. aud.

Ind., Warsaw—Kosciusko Co., concrete surfacing Kesslager Rd., to Gast Constr. Co., Warsaw, $53,146. Est. $61,398. Noted May 22.

Ind., Winchester—Bd. Educ. Randolph Co., improving J. B. Jordan Rd., to McCoun Constr. Co., Noblesville, $48,067 est. $49,950; Lewis Huston Rd., to J. L. Teegarden & Son, Union City, $28,223 est. $38,700. Noted May 29.

Iowa — State Hy. Comn., Ames, grading, flumes, paving 6.774 mi. roads in Audubon Co., to Moran Constr. Co., 50 Brundies Theatre Bldg., Omaha, Neb., $68,407—9.852 mi. Hancock Co., to McKenzie & Kileen, Superior, Wis., $181,280—0.617 mi. Johnson Co., and 0.276 mi. Linn Co., to Fred Carlson Constr. Co., Decorah, $16,856 and $9,506 respectively—11.702 mi. Linn Co., to J. P. Abramson, Des Moines, $237,518—8.793 mi. Monroe Co., to Wright Constr. Co., 1325 Main St., Des Moines, $158,782—grading 6.566 mi. Mahaska Co., to Elarton & Elliott, Bussey, $57,963—19.757 mi. Cass Co., to G. W. Condon Co., Grain Exch. Bldg., Omaha, Neb., $153,401 — 19.757 mi. Decatur Co., to J. W. Ault, Ft. Dodge, $115,729—0.312 mi. Iowa Co. and 1.324 mi. Keokuk Co., to C. E. Walker, Cedar Rapids, $3,202 and $10,865 respectively—3.381 mi. Marion Co., to W. F. Dollen, Neola, $32,202—6.661 mi. Wayne Co., to Shirley Constr. Co., 315 Union Bank Bldg., Omaha, Neb., $30,792—graveling 18 mi. F-192 and 13 mi. P-39, Plymouth Co., to Hartzell & Teepell, Lake View, $17,625 and $6,250 respectively. Grand total $1,100,378. Noted June 19.

Ia., Le Mars—Plymouth Co., grading 12 mi trunk roads, to Clark Constr. Co., Sioux City, $40,145. Noted May 29.

Kan., Kansas City—To C. F. Brindel, 2400 Minnesota Ave., Kansas City, 3 concrete alleys, $5,825; paving 13th St. $2,362; Oakland Ave., $6,576—to T. P. Thompson, 3908 Forest St., 22nd St. et al., $15,624; 7th Street traffic way at $3.63 per sq.yd. to Brown Bros., 2400 Brown Ave., sewer in Dist. 13, $3,269—to G. A. Luther, 1016 Greeley Ave., sewer in Dist. 30, Div. 5, $2,168.

Maryland — State Roads Comn., Baltimore, concrete aving 1.8 mi. Contr. C1-36-52, Carroll Co., to Spotsylvania Contg. Co., Highland Springs, Va., $42,491. Noted May 1.

Maryland — State Roads Comn., Baltimore, concrete paving 1 mi. Contr. P-114-34, Prince George's Co., to Caton Contg. Co., Halethorpe, $20,541. Noted May 15.

Maryland—State Roads Comn., concrete paving 1.4 mi. Contr. B-131-44, Baltimore Co., to Harry T. Campbell & Sons Co., Towson, $29,225; 1.2 mi. Contr. Ho-77-52, Howard Co., to Christhilf & Ensey Co., 1625 Ridgely St., Baltimore, $23,222. Noted June 6 Daily.

Maryland—State Rds. Comn., Baltimore, concrete shoulders, concrete base, concrete headers 6.4 mi. Contr. P-113-311, Prince George's Co., to Pennell & Harley, Inc., Spartanburg, S. C., $174,269. Noted June 12 Daily.

Massachusetts—Dpt. P. Wks., Boston, bituminous macadam paving 5,150 ft. hys. in Canton and Stoughton and bitulithic concrete paving 3,570 ft. hy. Framingham, to Perini & Ampollini, 242 Waverly St., Framingham, $25,602 and $18,973 respectively. Former contracts rescinded. Noted June 19 under "Contracts Awarded."

Mass., Boston—Dpt. P. Wks., sheet asphalt paving Harriett St., Ward 22, to J. McCourt Co., 910 Huntington Ave. Est. $25,000. Noted May 15.

Mass., Boston—Dpt. P. Wks., sheet asphalt paving Columbus Ave., Ward 9, to J. A. Singarella, Park Sq. Bldg., $92,689. Noted June 12.

Mass., Boston—Dpt. P. Wks., sheet asphalt paving Boylston St., Wards 3 and 5, to B. E. Grant, 77 Floyd St., Roxbury, $43,589; Adams St., Ward 15, to C. M. Callaham, Inc., 23 South Fairview St., Roslindale, $53,073. Noted June 26 Daily.

Mass., Chelsea (br. Boston) — Bituminous macadam surfacing 6th, Maple, Blossom, Spruce and Hurd Sts. Separate contracts. $30,000.

Mass., New Bedford — City, G. E. Stuart, comr. Streets, grading, rein.-con. culvert, Boyd Park, to P. DeCristoforo, 38 Glendower Rd., Roslindale, $36,383.

Mass., Newton—Bituminous macadam paving Beacon St., to C. M. Callahan, Inc., 23 South Fairview St., Roslindale. Est. $25,000.

Mass., Newton — Reconstructing Falmouth, Dana, Cambria and Arlington Rds., to J. B. Denaney, 79 Francis St., Waltham. Est. exceeds $25,000.

Michigan — L. N. Jones, resident engr., Crystal Falls, gravel resurfacing 11.5 mi. MO66-23-C2, Ontonagon Co., to Willard J. Smith, Houston, for State Hy. Dpt., Lansing, $33,234. Noted May 15.

Mich., Lapeer — Lapeer Co. Road Comn., grading, draining, gravel surfacing 8.1 mi. roads, to Baxter Cartage Co., 478 West Columbia St., Detroit, $59,747.

Mich., St. Joseph — Berrien Co., widening, sheet asphalt paving 5.4 mi. Territorial Rd., to point 1 mile east of Millburg, to W. J. Lang Constr. Co., Benton Harbor, $198,941.

Minn., St. Paul—K. L. Fiesseler, city purch. agt., paving Chatsworth and Montreal Aves., to W. W. Magee, 3rd and Market Sts., $14,121 and $19,663 respectively. Noted May 22.

Mississippi—State Hy. Comn., Jackson, concrete paving 2 mi. Cleveland-Boyle Rd., Bolivar Co., to Merrill Eng. Co., Jackson—grading 8.5 mi. Liberty-Berwick Rd., Amite Co., to T. Carey, 4310 Elba St., New Orleans, La., $82,003—3 bridges on Bay Springs-Raleigh-Brandon Rd., Smith Co., to J. C. Anderson & Son, Raleigh. Noted June 5.

Miss., Boyle — Rock asphalt paving 22,000 sq.yd., to Sullivan, Long & Hagerty, Bessemer, Ala., $35,178. Noted May 22.

Miss., Grenada—Grenada Co., clearing, grubbing, grading, Grenada-Memphis Rd., Federal Aid Project 209-A, to J. A. and H. E. Pigford, Russell, $42,194 plus 10% for engineering and contingencies.

Mo., Clayton—St. Louis Co., Court House, rein.-con. paving 10,032 ft. Dorsett and Fee Fee Rds., to W. A. Riley, 203 Title Guaranty Bldg., St. Louis, $88,110—610 ft. Alva Ave., to E. G. McKenna, 7353 Olive St., University City, $6,667—waterbound macadam on sledge stone paving 486 ft. Madison St., to Bangert Bros., 44 South Florissant Rd., Ferguson, $4,607. Grand total $99,384. Noted June 5.

Mo., Clayton—St. Louis Co. Court, Court House, paving Sutter Ave., also North and South Rd., to Webb-Boone Paving Co., 5103 Fyler Ave., $17,990 and $59,312 respectively. Noted May 29.

Mo., Fredericktown—Grading, curbing, rein.-con. paving 12,000 sq.yd., to Tidd & Cole, Saxton, $37,496.

Mo., Independence—Jackson Co., furnishing aplying 3 m.g. road oil, to P. Patton, 1921 Woodland Ave., Kansas City, at $0.063 per gal.

Mo., Kansas City—Jackson Co., paving and constructing bridge from Dawson south, to Drexel Constr. Co., 816 8th St., $35,025.

Mo., Kansas City—Jackson Co., furnishing applying 3,000,000 gal. road oil, to P. Patton, 1921 Woodland Ave., at $0.0524 per gal.

Mo., Kansas City—Paving 42nd St. and Baltimore Ave., to Midwest Paving Co., 25th and Summit St., $25,174 and $40,712 respectively.

Mo., St. Louis — Bd. P. Wks., City Hall, rein.-con. paving 1,440 sq.yd. Adeline St., to Skrainka Constr. Co., Security Bldg., $9,300—3,800 sq.yd. Page Blvd., to W. Watters, 2611 South Kingshighway, $22,686—asphalt paving 25,400 sq.yd. Evans Ave., to Crean & Scott Constr. Co., 1242 Sublette Ave., $110,165—warrenite bitulithic paving 4,425 sq.yd. Spring Ave., to Granite Bituminous Paving Co., Railway Exch. Bldg., $32,765—grading Lansdowne St., to A. Manegold, Title Guaranty Bldg., $3,420—Plateau St. to F. Weber, Jr., 4034 Bates St., $12,124—alleys in City Blocks 2717 and 5957, to A. Lewald, Inc., 6025 West Cabanne Ave., $6,488—City Blocks 3270, 4129 and 4130 to Creech Constr. Co., 5619 Natural Bridge Ave., $12,129. Grand total $209,077. Noted May 22.

Nevada—S. C. Durkee, state hy. engr., Carson City, furnishing, applying asphaltic fuel oil 22.24 mi. road from Woolsey to point 2 mi. south of Humboldt House, Pershing Co., to A. D. Drumm, Jr., Fallon, $43,856. Noted June 12.

New Jersey—State Hy. Comn., Trenton, bituminous concrete paving road between Newark Airport and Elizabeth, to J. B. Gilligan-Casey Co., 972 Broad St., Newark, $48,025. Noted June 19.

N. J., Cranford—Twp. Comn., Town Hall, curbing, sidewalks, 6 in. concrete paving Eastman St., Union, Walnut and North Aves., to P. Camillo, 335 Spring St., Westfield, $44,434.

N. J., Paterson—Bd. City Comrs., City Hall, penetration macadam paving Wait, Franklin, Fulton, Harrison, East 25th and Market Sts., to Richard S. Sowerbutt, 244 Highland Ave., $41,077.

N. J., Rutherford—Bd. Boro Council, Boro Hall, asphaltic macadam paving Springfield and West Gouverneur Aves., to Union Building & Constr. Co., 150 Prospect St., Passaic, at $1.43 per sq.yd. Est. $25,000.

N. Y., Buffalo—W. G. Hickman, County Hall heavy foundation paving Genesee Rd., Part 2 C. R. 448, North Collins, to Holmes & Murphy, Orchard Park, $56,700; rein.-con. paving 1.67 mi. Union Rd. C. R. 212, west of Seneca, and waterbound macadam paving 0.99 mi. McClosky Rd., C. R. 513, to Stapell, Munn & Beals, Camp Rd. and Erie R.R., Hamburg, $36,800 and $19,750 respectively. Grand total $113,250. Noted July 3.

N. Y., New York—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., to Ruzel Contg. Co., grading Byron Ave., $12,280. Paulding Ave., $9,556—to C. D. Beckwith, Seneca Ave. and Edgwater Rd., bituminous concrete paving Nereid Ave., $26,422; asphaltic paving Bryant Ave., $11,120; Reservoir Ave., $79,755; asphalt block paving Home St., $17,043—to Burnside Contg. Co., 270 Burnside Ave., asphalt paving Fulton St., $25,650. Grand total $181,826. Noted June 19.

N. Y., St. George—J. A. Lynch, pres. Richmond Boro, Boro Hall, grading Joan Lane, to J. Johnson, 455 Bway., West New Brighton, $2,603. Noted May 19.

N. Y., Syracuse — Bd. Contr. & Supply, to G. B. Dickinson, Union Bldg., Syracuse, asphalt resurfacing Court St., $30,297; Lodi and West Fayette Sts., $42,891; East Brighton Ave., $15,777; Jamesville Ave. $9,359. Grand total $135,110.

O., Akron—Grading, draining, curbing, Texaco asphalt paving 7,475 sq.yd. Melbourne Ave., et al., 24 ft., to P. Maline, 52 Hoover St., $39,008. Est. $48,000.

O., New Comerstown—Curbing, grading, concrete paving 2,620 ft. Carlysle St., 20 ft., to W. M. Brode, New Comerstown, $20,847.

O., Youngstown—Bd. Control, curbing, grading, Missouri cement paving Market St., to Victor Olson Contg. Co., Mahoning Bank Bldg., $61,830. Noted June 26 Daily.

Okla., Oklahoma City—Sheet asphalt resurfacing 15,000 sq.yd. Main St., to Western Paving Co., Petroleum Bldg., $31,426. Est. $33,000.

Pa., Pittsburgh—Dpt. P. Wks., to Booth & Flinn, 1942 Forbes St., repaving 5th Ave., $18,228—to McDonough & O'Toole, 514 Climax St., Heinz St., $2,606—to Narduli & Sons, 608 Larimer Ave., Pocusset St., $19,179; Durbin St., $16,385; and grading, curbing, paving Eleanor St., $7,013 — to A. Diulius, 3903 Boquet St., Fingal St., $11,044. Grand total $74,455.

R. I., Providence—Bd. Contr. & Supply, sheet asphalt paving Narragansett Blvd., to Lane Constr. Corp., 134 State St., Meriden, Conn., $20,486. Est. $25,000.

South Dakota—State Hy. Comn., Pierre, constructing 1.5 mi. State Aid Project 202, Lake Co., to Booth & Olson, 620 Insurance Exch. Bldg., Sioux City, Ia., $38,047.

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Streets and Roads (Continued)

Tennessee—State Dpt. Hys. & P. Wks., Nashville, grading, drainage structures 12.835 mi. roads in Hickman Co., to J. B. Turner, 5032 Georgia Rd., Birmingham, Ala., $167,887—11.589 mi. Fayette Co., to James Spence & Son Constr. Co., Hot Springs, Ark., $96,307—9.78 mi. Fayette Co., to S. K. Jones Constr. Co., Cotton Exch. Bldg., Memphis, $79,583—concrete paving 8.773 mi. Roane and Cumberland Counties, to John L. Humbard Constr. Co., Knoxville, $194,707—concrete, steel bridge, approaches over Sycamore Creek and improving 0.699 mi. road in Cheatham Co., to Alexander Bros. & Hopson, Cadiz, Ky., $40,661. Grand total $579,145. Noted June 12.

Tex., Amarillo — City, c/o W. N. Durham, mgr., 1½ in. rock asphalt on 6 in. caliche paving, 54,954 sq.yd., to J. W. Zempter Constr. Co., 718 Fisk Medical & Professional Bldg. Noted June 12.

Tex., Marshall—City Comrs., 6 in. rein.-con. paving 84,000 sq.yd., to Fry Bros., Athens, $235,015. Noted May 29.

Tex., Waco—For 1½ in. asphalt on 8 in. rock paving 12,000 sq.yd., to Coombs & Glade, Waco, $27,000.

Utah — State Rd. Comn., Salt Lake City, graveling 5.62 mi. Summit Co., to Gibbons & Reed, Continental Bank Bldg., Salt Lake City, $53,712; resurfacing, oiling 7 mi. Lincoln Hy. between Baskin and Emory, to A. G. Young & Co., Richfield, $11,335. Noted June 19.

Utah — State Rd. Comn., Salt Lake City, grading, surfacing 7.57 mi. Salt Creek Canyon Rd., Juab Co., to Utah Constr. Co., Ogden, $66,250. Est. $85,118.

Utah—Carbon Co. Comn., Price, rock asphalt paving 4.7 mi. Spring Canyon Rd., to C. S. Harris, Price, $44,500.

Va., Bristol—Constructing 5 streets, to L. A. Gridley Constr. Co., Knoxville, $64,551.

Washington—S. J. Humes, dir. State Hys., Olympia, crushed stone surfacing 28.6 mi. State Rd. 3, Whitman and Spokane Counties, to Standard Asphalt Paving Co., 603 Chronicle Bldg., Spokane, $38,225. Noted May 22.

Washington—S. J. Humes, dir. Hys., Olympia, crushed stone and bituminous treated road surfacing 53.1 mi. State Road 2, through Snoqualmie Pass in Cascade Mts., King and Kittitas Counties, 20 ft., to C. J. Erickson, 1424 Vance Bldg., Seattle, $109,836.

West Virginia—State Roads Comn., Charleston, improving Project 173-F, Fayette Co., and Project 2048-C, McDowell Co., to Hatfield Constr. Co., Huntington, $162,380 and $95,772 respectively—Project 180-A, Marion Co., to R. W. Fimple, Fairmont, $40,097—Project 3486, Ohio Co., to Consolidated Eng. Co., Wheeling, $80,460—Project 3212-B, Randolph Co., to Mace Constr. Co., Webster Springs, $760,639—Project 3294, Randolph Co., to Gilbert Constr. Co., Baker, $65,292—Project 3448, Upshur Co., to Mohican Constr. Co., Newark, O., $59,277—Projects 3129, 3385 and 3386, Wyoming Co., to Southern Oil & Tar Co., Louisville, Ky., $24,244—Project 173-F, Fayette Co. and substructure bridge Project 141, Pocahontas Co., to Pocahontas Constr. Co., Cass, $128,712 and $3,770 respectively — superstructure bridge Project 141, Pocahontas Co., to Echols Bros., Alderson, $3,900. Grand total $724,543.

Wisconsin — State and Milwaukee Co. Hy. Comns., Milwaukee, grading, concrete paving 3.66 mi. South County Line-South Milwaukee Rd., to J. R. Griffith, Racine, $108,853. Noted June 5.

Wisconsin — State Hy. and Sheboygan Co. Comns., Sheboygan, concrete surfacing 11.273 mi. Sheboygan Falls-North County Line Rd. S. T. Hy. 42, S.A.P. 2926, to Streu Constr. Co., Two Rivers, $195,091. Noted June 19.

Wyoming—State Hy. Comn., Cheyenne, grading, paving 2.966 mi. Carbon Co., to Blanchard Bros., 1641 South Logan St., Denver, Colo., $10,965—2.902 mi. Lincoln Co., to T. E. Madden, Wamsutter, $17,983—11.005 mi. Campbell Co., to Walls Bros. Constr. Co., Buffalo, $22,630. Grand total $51,578.

Ont., Hamilton—Asphalt on concrete paving Haddon Crescent and 6 streets, day labor, $155.-110. W. L. McFaul, City Hall, engr.

Ont., Leaside—Town Council asphalt on concrete paving Edith and Clowes Aves., Hanna and McNaughton Rds., Cameron and Fleming Crescents, to Rayner Constr. Co. Ltd., 159 Bay St., Toronto, $74,961.

Ont., Sudbury — Town, concrete, guttering, bitulithic on concrete paving, to Warren Bituminous Paving Co., 54 University Ave., Toronto. Est. $40,000.

Ont., Toronto—Asphalt paving Harwood Rd., Briar Hill and Castlefield Aves., to Kilmer & Barber, Roger Miller Bldg., Toronto, $40,467; asphaltic concrete and brick block paving Castle Knock Rd., to Godson Contg. Co., Ltd., 203 Richmond St. W., $12,229.

Ont., Welland—Bertie Twp. macadam paving Stevensville-Ridgeway Rd., to Law Constr. Co. Ltd., Confederation Life Bldg., Toronto. Est. $30,000.

Ont., Whitby—Ontario Co., grading, graveling, macadam paving, also road maintenance, mostly day labor. $80,000. D. J. Kean, County Bldg., engr.

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EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Calif., Alameda—Alameda Airport, Inc., Alameda, yacht harbor in San Francisco Bay near outer end Alameda Mole, incl. dredging, 2 wooden breakwaters, mooring steel vessel, filling in area shoreward of yacht harbor.

Mass., Boston—Commonwealth of Massachusetts, Dpt. P. Wks., dredging at India and Central Wharves, Boston Harbor. $26,400. A. W. Dean, dpt. P. Wks., engr.

Mass., Braintree—Commonwealth of Massachusetts, Dpt. P. Wks., Boston, dredging approach to Cities Service Terminal, Boston Harbor. $30,000. A. W. Dean, Dpt. P. Wks., Boston, engr.

Mass., East Boston (sta. Boston)—Commonwealth of Massachusetts, Dpt. P. Wks., State House, Boston, dredging off Cunard Pier, Boston Harbor. $21,000. A. W. Dean, Dpt. P. Wks., Boston, engr.

Mass., Woods Hole — Woods Hole Oceanographic Institutions, Falmouth, sea wall, timber pier, intake house, float and solid fill. $25,000, or more. Private plans.

Miss., Biloxi—Harrison County Road Protection Com. and Bd. Supervs. Harrison Co., 7,000 ft. seawall between Holmhaven and Heartease Park on Gulf of Mexico. $119,000. P. D. Bonham, Gulfport, engr.

Tex., Edinburg—Hidalgo Co. Water Control & Impvt. Dist. 12, c/o N. L. Reyna, pres., postponed taking bids until after bonds are sold for installation concrete irrigation system for 78,000 acre tract, 1,000,000 sq.ft. canal lining, $5,500,000. Noted Mar. 27.

BIDS ASKED

Ill., Newark—July 11, by Comrs. Big Slough Drainage Dist., Kendall Co., widening, repairing main drainage ditch., incl. 66,000 cu.yd. excav. P. J. Keller, Morris, engr.

Ind., Clinton—July 16, by Bd. Comrs. Clinton Co. Prairie Creek Ditch, 10 mi. long, $55,000. N. T. Amos, Frankfort, engr.

La., Lake Charles—July 14, by E. F. Dayle, atty. for Gravity D.D. 3, Chavanne Bldg., 22 mi. main ditch work and 34 mi. laterals, incl. 825,000 cu.yd. excav. $78,000. F. Shutts & Sons, Lake Charles, engrs.

Mich., Detroit—July 9, by H. I. Dingeman, drain comr. Wayne Co., Bird Marsh Drain, 12,500 ft. long, having average depth of 4.59 ft. and bottom width of 2 ft.

Mich., Detroit—July 14, by H. I. Dingeman, drain comr. Wayne Co., Van Cleef Drain, 11,-992 ft. long, average depth 3.8 ft. and bottom width 2 ft., in Brownstown Twp. $25,000.

Miss., Marks — July 10, at office M. E. Denton, cleaning out and enlarging canal bottoms, incl. 150,000 cu.yd. excav., for Little Opossum Bayou Drainage Dist.

N. Y., Brooklyn—July 9, by H. Hesterberg, pres. Brooklyn Boro. Boro Hall, dredging Newtown Creek Canal and basins; dredging Wallabout and dredging Gowanus Canal.

Tex., Edinburg—July 10, by Hidalgo Water Impvt. Dist. 6, c/o A. L. Cramer, pres., laying 221,500 sq.ft. concrete canal lining, incl. earth work. A. Tamm, 209½ Jackson St., Harlingen, dist engr. Noted June 26.

Tex., Rio Hondo—July 10, by Cameron Co. Water Impvt. Dist. 15, c/o S. Finierewing, Rio Grande Life Insurance Bldg., Harlingen, irrigation work, incl. installation concrete pipe lines, meters, pumps, etc. A. Tamm, 209 West Jackson St., Harlingen, engr. Noted Sept. 19.

Que., Sorel—June 27, by N. Desjardins, secy. Dpt. P. Wks.; Ottawa, Ont., dredging 125,000 cu.yd. silt, sand and clay. $65,000. K. M. Cameron, Dpt. P. Wks., Ottawa, Ont., engr.

CONTRACTS AWARDED

Fla., Miami Beach—City, bulkheading ocean front between 33rd and 43rd Sts., using copper bearing steel, and eliminating 29,000 cu.yd. earth fill in Area "B," to G. O. Reed Co., 1345 20th St., $125,186.

Ia., Garner — Hancock Co. drainage work, incl. 34,000 cu.yd. excav. in D. D. 65, and 39,319 cu.yd. excav. in D. D. 1 and 2, to L. Davis, Clear Lake.

N. S., Yarmouth—N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., dredging, to St. John Drydock & Shipbuilding Co. Ltd., St. John N. B., $85,898. Noted June 5.

Ont., Collingwood—Dpt. P. Wks., Parliament Bldgs., Toronto, dredging, to W. L. Forrest, Goderich, $48,458.

Ont., Kingston—N. Desjardins, secy. Dpt. P. Wks., Ottawa, new breakwater, to Canadian Dredging Co. Ltd., Kingston, $200,313. Noted May 29.

Public Bond Elections

Bonds Voted

Waterworks—Springfield, Ill., $2,500,000.
Reservoir—Clarinda, Iowa, Burns & McDonnell, Kansas City, Mo., Engrs., $75,000.
Reservoir and Pipe Line—Mt. Pleasant, Tenn., $25,000.
Waterworks—Rankin, Tex., $35,000.
Drainage—Coahoma County, Miss., $60,000.
Gas District System—Guthrie, Okla., W. V. Monton, Engr., $225,000.
School—Welborn, Kan., $175,000.

Coming Bond Elections

Airport—Harlingen, Tex., July 8, $200,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Ala., Montgomery—HANGARS and WAREHOUSE—Con. Q.M. hangars, warehouse.

Mich., Detroit—DREDGING—U. S. Eng. 69,-000 cu.yd. Rouge River.

N. J., Bordentown—DREDGING—U. S. Eng., Phila., Pa., dredging 937,000 cu.yd. in Delaware River.

Pa., Phila.—DREDGE—U. S. Eng. repairing dredge Manhattan.

Tex., Randolph Field—HANGAR, etc.—Con. Q. M. bids after July 15, hangars and field buildings.

Tex., Randolph Field—MESS HALL—U. S. Eng. bids after Aug. 1, 1 story, rein.-con. cadet mess hall building; paving hangar lines; erecting 60 steel hangars; constructing underground electrical system; installing natural gas system; storm sewers.

Wis., Milwaukee—DERRICK BOAT—U. S. Eng. 25 ton derrick boat.

BIDS ASKED

Connecticut—DREDGING—Aug. 1, by U. S. Eng. Office, Providence, R. I., 94,900 cu.yd. in Thames River; adv. E. N.-R. July 3.

D. C., Wash.—TRUCK LOADERS, etc.—Spec. 2571—July 16, by A. L. Flint, genl. purch. agt., truck loaders, automobiles, metal partitions, water meters. Schedule 2571.

Idaho—ROAD—July 10, by Pub. Rds., Ogden, grading 6.95 mi. National Forest Rd., Lemhi Co.; 5.92 mi. National Forest Rd., Payette Natl. Forest, Valley and Boise Counties. B. J. Finch, 403 Kiesel Bldg., Ogden, Utah, dist. engr.

Kan., Wichita—POST OFFICE—July 30, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing (except elevators) U. S. Post Office and Court House; adv. E. N.-R. July 3.

Mass., Boston—LUMBER, etc.—July 8, by Bureau Supplies & Accounts, Navy Dpt., Wash., D. C., lumber, steel to Boston Navy Yard.

Miss., Greenwood—POST OFFICE—July 28, by, Treas. Dpt. at office Sup. Archt., Wash., D. C., extending, remodeling U. S. Post Office; adv. E. N.-R. July 3.

Missouri—DIKES—July 16, by U. S. Eng., 428 Custom House, St. Louis, 4,000 lin.ft. timber crib dikes in Mississippi River, Slim Island; adv. E. N.-R. July 3.

N. Y., Buffalo—BULKHEAD—July 14, by Superintendent of Lighthouses, concrete pile bulkhead wall and dredging at Buffalo Lighthouse Depot; adv. E. N.-R. July 3.

Tenn., Kingsport—POST OFFICE—July 25, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E. N.-R. July 3.

Utah — ROAD — July 10, by Federal Pub. Rds., Ogden, grading, crushed rock surfacing 15.9 mi. Heber Fruitland Forest Rd., Vinla Natl. Forest, Wasatch Co. B. J. Finch, 403 Kiesel Bldg., Ogden, dist. engr.

Wyo., Cheyenne—STADIUM—See "Contracts Awarded."

CONTRACTS AWARDED

Conn., Niantic—INCINERATOR—Property & Disbursing Officer, State Armory, Hartford, 3 ton incinerator, to E. U. Bartolucci & Co., 42 Central Ave., New Haven, $3,400. Noted June 5.

Ga., Fort Oglethorpe—GRADING, etc.—Con. Q. M., grading, paving Lafayette Rd., to Brown Contg. Co., 706 Manning St., Chattanooga, Tenn., $386,001. Noted June 5.

Idaho—ROAD—U. S. Bureau Reclamation, Denver, Colo., earthwork and structures for flow line and valve house for Deadwood Reservoir, Payette Div., near Payette to Utah Constr. Co., Ogden, $18,481. Noted May 29.

Ill., Woodriver—EARTHWORK—Wood River Levee D.D., U. S. Eng. Office, 428 Custom House, St. Louis, Mo., 28,000 cu.yd. earthwork and 150,000 sq.ft. stone revetment in repairing and protecting levees on Wood River, to Wills Constr. Co., 6029 Clemons Ave., St. Louis, Mo., $40,600.

Louisiana—LEVEES—U. S. Eng., New Orleans, to Grasser Constr. Co., 540,000 cu.yd. levee in La Fourche Levee Dist. $89,046, 775,000 cu.yd. $127,798; to Smith Constr. Co., Memphis, Tenn., 2,020,000 cu.yd. in Lower Lenoas Levee Dist., $540,420; to Orleans Dredging Co., Maison Blanche Bldg., New Orleans, 8,819,000 cu.yd. Louisiana and Texas Intracoastal Waterway, $687,882; to Lower Coast Constr. Co. Ltd., Godchaux Bldg., New Orleans, 245,000 cu.yd. in LaFourche Levee Dist. $32,830, 235,000 cu.yd. $31,490, 50,000 cu.yd. Atchafalaya Levee Dist. $10,500; to Highways Constr. Co., Inc., Godchaux Bldg., New Orleans, 500,000 cu.yd. Pont Levee Dist., $80,000; to S. Leopold, New Orleans, 85,000 cu.yd. Lake Borgne Levee Dist., $12,946; to D. B. Hearin & Co., Baton Rouge, 340,000 cu.yd. levee dist., $52,462; to H. Kenyon Dredging Co., 3603 McKinney St., Houston, Tex., 367,000 cu.yd. Barataria Levee Dist., $58,-610. Grand total $1,723,984.

Mass., Provincetown — DWELLING — Coast Guard, 2 story, frame, concrete found. at Race Point Coast Guard Station, to A. E. Mangs, 622 Minneford Ave., New York, $14,740. Noted May 15.

Federal Government (Continued)

N. Y., Brooklyn—ELEVATORS—Treas. Dpt. at office Sup. Archt., complete elevators in U. S. Post Office, to Otis Elevator Co., 810 18th St. N. W., $151,380. Noted May 22.

Pa., Phila.—RIP RAP—U. S. Eng. rip rap work at Edgemoor Dike, Delaware River, to Rendle Corp., East Boston, Mass., $61,750.

Pa., Phila.—WATER PIPE—Treas. Dpt. at office Sup. Archt., installing brass water pipe in post office and court house, to L. J. Sommers, 2436 Brown St., $13,995. Noted May 29.

Vt., Bellows Falls—POST OFFICE—Treas. Dpt. at office Sup. Archt., 2 story, basement, brick, to Charles Weitz Sons, 713 Mulberry St., Des Moines, Ia., $67,132. Noted May 15.

Wyo., Cheyenne — STADIUM — Con. Q. M., stadium, at Fort Warren, day labor, $50,000. S. R. DeBoer, 515 East Iliff Ave., Denver, Colo., landscape archt.

RAILWAYS

PROPOSED WORK

Oregon and California—Great Northern Railway Co., J. R. W. Davis, ch. engr., Railroad Bldg., St. Paul, Minn., 88 mi. track from Klamath Falls, Ore., to Lookout, Calif. $3,570,000.

BIDS ASKED

New York—July 11, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, altering railroad structure to permit widening roadway Lexington Ave., between 72nd and 86th Sts., Agreement "IV."

CONTRACTS AWARDED

New York — A. Goldman, comr. Plant & Structures, Municipal Bldg., New York, trolley tracks changes at Brooklyn and Manhattan Terminals of Williamsburg Bridge, to T. H. Reynolds Co., 98 Park Pl., New York, $82,300. Noted June 19.

SUBWAYS AND TUNNELS

BIDS ASKED

Kan., Wichita—July 7, at office C. C. Ellis, city clk., sub-structure subway under railroad tracks at Waterman St., incl. 7,800 cu.yd. excav., 3,300 cu.yd. backfill, abutments and column footings complete. Atchison, Topeka & Santa Fe Ry. Co. 80 East Jackson Blvd., Chicago, Ill., G. W. Harris, ch. engr. will construct track falsework.

GRADE CROSSINGS

PROPOSED WORK

Ark., North Little Rock — Missouri Pacific R.R. Co., E. A. Hadley, ch. engr., 13th and Olive Sts., St. Louis, Mo., preliminary plans rein.-con. subway at 3rd and Poplar Sts. $90,000.

Ill., Springfield—City approved special tax to finance construction 3 subways under railroad crossings.

N. Y., Reading—Dpt. P. Wks., Albany, eliminating railroad grade crossing 200 ft. south of Reading Center Station, on Watkins-Yates County Line Hy., Schuyler Co. $56,000.

DAMS

CONTRACTS AWARDED

Mich., Traverse City—See "Power Plants."

PIERS AND WHARVES

PROPOSED WORK

Mass., Barnstable—PIER—L. E. White, pile, timber pier, wharf, fill, Wequaquet Lake, Centerville Sect. $25,000. Private plans.

CONTRACTS AWARDED

Mass., South Boston (sta. Boston)—PIERS—Boston Fish Market Corp., 28 Fish Piers, 3 timber, wood pile slip piers at Boston Fish Pier, to W. H. Ellis & Son Co., 479 Meriden St., East Boston. Est. $25,000 or more.

N. S., Port Williams—WHARF—Dpt. P. Wks., Ottawa, Ont., extending wharf, to H. B. Bigelow, Port Willlams, $8,910.

Ont., Goderich—PIERS—Dpt. P. Wks., Ottawa, constructing north and south piers, to Detroit River Constr. Co. Ltd., Windsor, $31,690 and $16,157 respectively. Noted June 19.

Ont., Port Stanley—PIER—Dpt. P. Wks., Ottawa, constructing west pier, to Detroit River Constr. Co. Ltd., Windsor, $45,393.

AIRPORTS

PROPOSED WORK

N. Y., Malone—Malone Aero Club, Inc., steel hangar for 4 planes.

BIDS ASKED

Mass., Mansfield—Trustee of F. Boltz, c/o L. G. Foster, archt., 101 North Main St., taking bids 1 and 2 story, concrete, steel airport hangar, office and machine shop. $30,000.

CONTRACTS AWARDED

Ariz., Yuma — Yuma Co., steel aeroplane hangar, to C. W. Highfill, Yuma, $12,897.

GRAIN ELEVATORS

CONTRACTS AWARDED

Ia., Des Moines—GRAIN ELEVATOR—Des Moines Elevator & Grain Co., 712 Hubbell Bldg., 12 rein.-con. grain storage bins, 18th and Vine Sts., to Jones-Hettelsater Constr. Co., 600 Mutual Bldg., Kansas City, Mo. Est. $40,000.

Utah, Ogden—GRAIN ELEVATOR BINS—Globe Grain & Milling Co., Ogden, 40 grain elevator bins, rein.-con., to Jones Hettelsater, 600 Mutual Bldg., Kansas City, Mo. $200,000. Noted June 19.

Wis., Milwaukee—GRAIN ELEVATOR—Chicago, Milwaukee, St. Paul & Pacific R.R. Co., C. F. Loweth, ch. engr., Union Sta., Chicago, Ill., 2,000,000 bu. grain elevator, to James Stewart & Co., 343 South St., Chicago, Ill., Cargill Grain Co., Milwaukee, lessee.

POWER AND LIGHTING

BIDS ASKED

Pa., Phila.—July 10, by C. E. Myers, City Hall, electric conduit and temporary lighting systems for subway in Ridge Ave. and 8th St. to Randolph St.

Ontario—See "Contracts Awarded."

CONTRACTS AWARDED

N. Y., New York—Bd. Higher Education, at office Secretary Hunter College, Park Ave. and 68th St., electric wiring, powerhouse-cafeteria-social unit, Hunter College, to Rao Eng. Co., Inc., 369 Lexington Ave., $50,950. Noted May 29.

Ontario—Hydro-Electric Power Comn. of Ontario, 190 University Ave., Toronto, F. A. Gaby, ch. engr., 154 mi. wood pole power distribution line from Utterson to Windermere, day labor, $50,000.

SPORTS AND PARKS

PROPOSED WORK

Calif., Sacramento—Pacific Coast Ice Hockey League, c/o Starks & Flanders, archts., Forum Bldg., preliminary plans skating pavillon, 6,000 seating capacity. $750,000.

Idaho, Baker—Baker Golf & Country Club, J. W. Stuchell, pres., preliminary plans golf course and club house. $50,000.

N. J., Fort Lee and Englewood — Bd. City Council, converting Crystal Lake into 200 x 200 ft. swimming pool by covering bottom with sand, installing modern chlorinators. $25,000. J. Paluga, Ft. Lee, lessee.

N. Y., Glen Cove—Morgan Memorial Park, c/o H. S. Morgan, 23 Wall St., New York, improving Morgan Memorial Park. $1,000,000.

N. Y., New York—Park Bd, W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, rejected bids June 17, recreational building, McCombs Dam Park. Noted June 19.

N. Y., New York—Woodmanster Casino Pool, Inc., G. Stevenson, pres., 415 Lexington Ave., 38 x 238 ft. concrete swimming pool, Williamsbridge Rd., and Morris Park Ave. $66,000. J. Brown, 101 Park Ave., archt.

BIDS ASKED

N., Y., New York — July 9, by J. Miller, pres. Manhattan Boro. Municipal Bldg., general contract erecting and completing natatorium, comfort station, indoor playground, and roof garden in Hudson Park, adjoining 83 Carmine St.

CONTRACTS AWARDED

Mass., Holyoke—J. L. Perkins, Harvard St., concrete swimming pool, to Daniel O'Connell's Sons, Inc., 480 Hampden St. Est. $25,000.

O., Cleveland—City, D. Morgan, mgr., grading 100,000 cu.yd. site for Lakefront Stadium, to Fifth City Excavating Co., 1960 East 123rd St., $29,400. Noted June 5.

HEATING AND VENTILATING

BIDS ASKED

Mass., Worcester—City, R. P. Spaulding, taking bids heating, plumbing, electrical work in high school. L. W. Briggs Co., 314 Main St., archts.

N. Y., Elmhurst — July 7, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, heating, plumbing, drainage, ventilating, electrical work, for P. S. 13, 94th St., 55th and 56th Aves., for Bd. Educ., 500 Park Ave., New York.

N. Y., Long Island City—July 7, by W. C. Martin, archt., and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, heating, ventilating, plumbing, drainage, electrical work in P. S. 151, 31st Ave. from 50th to Hobart Sts., for Bd. Educ., 500 Park Ave., New York.

UNCLASSIFIED

PROPOSED WORK

Mass., Walpole—MEMORIAL—Town, H. W. Caldwell, chn. com., memorial, Kendall St. $30,000. Engineer not selected.

Miss., Adams—TOWER—Commonwealth of Massachusetts, W. H. Sperry, 116 Pleasant St., North Adams, beacon memorial tower, Mt. Greylock. $25,000 or more.

Mo., St. Louis—SIGNAL SYSTEM—Bd. P. Serv., 208 City Hall, soon takes bids in interlocking signal plant at crossing of track of southern railroad approach to St. Louis Municipal Bridge over Mississippi River and Missouri Pacific R.R. tracks. $125,000. Private plans.

Montana, Minnesota and North Dakota—GAS PIPE LINE—Minnesota-Dakota Utilities Co., 831 2nd Ave. S., Minneapolis, Minn., 200 mi. gas pipe line from gas fields at Baker, Mont. extending eastward through eastern North Dakota to Twin Cities and Duluth, Minn. $4,500,000. Private plans.

New Mexico, Texas and Arizona—NATURAL GAS PIPE LINE—Western Natural Gas Co., Roswell, N. M., surveys 750 mi. 12 in. screw pipe line from fields in Lea County, N. M. via El Paso, Tex. to Douglas, Phoenix, Ariz., $14,000,000. Private plans.

N. Y., Minoa—BROADCASTING STATION—Station WFBL, Hotel Onondaga, Syracuse, broadcasting plant, incl. two 700 ft. towers, fireproof building to house transmitting equipment. $100,000.

N. Y., New York—COAL POCKET—Silver Coal Co., 1616 Webster Ave., plans by Derrick & Hoist Constr. Co., 539 Hudson St., coal pocket, 19 East 40th St. $40,000.

N. Y., New York — COKE OVENS — Consolidated Gas Co. of New York, 4 Irving Pl., plans by J. F. Hunter, 4 Irving Pl., concrete coke ovens, Hunters Point Ave., East Bay and Bronx River. $250,000.

Texas—OIL PIPE LINE—Houston Oil Co., c/o E. H. Buckner, pres., Petroleum Bldg., Houston and Brunt, 80 mi. 12 in. oil pipe line from point near Brunt (near Laredo), to vicinity Corpus Christi, to connect with tank farm. $400,000. Private plans.

Ontario—FISH HATCHERIES—Dpt. Game & Fisheries, Parliament Bldgs., Toronto, fish hatcheries, concrete, steel, at North Bay, Pembroke, Codrington, Fort William and Sault Ste. Marie. $150,000. Private plans.

N. Y., New York—DUMP CARS—July 8, by Bd. Transportation, J. H. Delaney, chn. 250 Hudson St., 4 air dump cars, 207th St. Yard.

N. Y., New York — FOUNDATIONS, etc. — July 10, by E. P. Mulrooney, police comr., 240 Center St., foundations and subsidiaries for proposed traffic control standards along 5th Ave. from Washington Sq. to 59th St.; traffic signal posts, lanterns, control boxes, subsidiary pipe and lead covered cable on Hudson St. and 8th Ave.; installing traffic posts on Edgecomb, Convent, Broadhurst Aves., Manhattan and Bronx Boros.

West Virginia—CULVERTS—See "Streets and Roads."

CONTRACTS AWARDED

Mass., Boston — STEAMSHIPS — Eastern Steamship Lines, Inc., 3 steamships, to Newport News Shipbuilding & Dry Dock Co., Newport News, Va., $3,000,000 each. Noted May 1.

Missouri — SIGNAL SYSTEM — Missouri Pacific R.R. Co., E. A. Hadley, ch. engr., Missouri Pacific Bldg., St. Louis, extending centralized control signaling system to include 18 mi. double and 3.5 mi. single track between Kirkwood and Washington, to General Ry. Signal Co., Railway Exch. Bldg., St. Louis.

Mo., St. Louis—SILOS—Inland Valley Coal Co., Equitable Bldg., 6 rein.-con. silos, 307 South Vanderventer Ave., to Gifford-Wood Co., 565 West Washington St., Chicago, Ill. Est. $25,000.

N. Y., New York—CABLE EQUIPMENT—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., furnishing, installing cable equipment for portion Independent System of City Subways, to J. Sugden Co., 67 West 44th St., $199,801. Noted June 5.

N. Y., New York—PLUMBING—Bd. Higher Educ., Main Bldg., 159th St. and Convent Ave., plumbing for Vocational Building, College of City of New York, to Hygrade Plumbing Co., 324 West 25th St., $18,535. Noted June 5.

Utah, Ogden—SHEEP SHED—Ogden Union Stockyards Co., Ogden (1st unit) 1 story sheep shed, concrete, to W. Treseder, Ogden. Est. $100,000.

Utah, Salt Lake City—WALKS, etc.—State, Capitol, walks and steps at west entrance approach of Capitol grounds, to Mullins & Wheeler, Salt Lake City, $11,174. Est. $11,133. Noted Feb. 20.

Wyo., Laramie—AUTO CAMP—H. Meadow, c/o Laramie Hide & Junk Co., 30 cabins for auto camp, to Willhard & Co., Laramie, $50,000.

Ont., Collingwood—CRIBS—Dpt. P. Wks., Ottawa, 2 mooring cribs, to W. Berminghan & Son, Kingston, $35,458.

MATERIALS

BIDS ASKED

GRANITE BLOCK—**Chicago, Ill.**—July 8, by City, Dpt. P. Wks., City Hall, granite paving block, f.o.b. cars Chicago & Northwestern Ry. switchtrack at Roosevelt Rd. and Rockwell St., required by Bureau Streets during remainder of 1930. R. W. Wolfe, comr.

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Materials (Continued)

ASPHALT CEMENT — Brooklyn, N. Y. — July 9, by H. Hesterberg, pres. Brooklyn Boro. Boro Hall, 400,000 gal. asphaltic cement, sheet asphalt and bituminous concrete mixtures "B," in liquid form; 15,000 cu.yd. asphalt sand; 15,000 cu.yd. binder stone.

STEEL, etc.—Phila., Pa.—July 9, by C. E. Walsh, purch. agt., Pennsylvania R.R., 15 North 32nd St. Contr. 16, structural steel. Contr. 16-1930; boiler tubes. Contr. 17-1930; track fastenings. Contr. 18-1930.

STRAIGHT GRANITE CURBING — Providence, R. I.—July 7, by Bd. Contr. & Supply, 25,000 lin.ft. 7 in. straight granite curbing to Dpt. P. Wks.

GUARD FENCE—West Virginia—See "Street and Roads."

EQUIPMENT

BIDS ASKED

GRADER, etc.—Yazoo, Miss.—July 7, by Bd. Supervs. Yazoo Co., F. J. Love, clk. 12 ft. road grader.

FOREIGN

Mexico, Matamoras—City plans airport, incl. steel hangars, shop, runways, landing fields, flood and beacon lights, for Pan American Airways System. Eng. Dpt., Mexican Govt., Mexico City, engrs.

Buildings

RESIDENTIAL

BIDS ASKED

Ark., Hot Springs—See "Contracts Awarded."

N. J., Jersey City—See "Contracts Awarded."

N. J., Newark—See "Contracts Awarded."

N. J., Newark—J. B. Acocella, archt., 9 Clinton St., bids about Aug. 1, general contract 2 story, basement, 100 x 150 ft., brick, steel apartment, garage, stores, for Owner, c/o architect. $150,000. Noted June 12.

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

N. Y., New York—C. S. Clark, archt., 443 East Tremont Ave., taking bids on separate contracts 6 story, 84 x 194 ft. apartment, Andrews Ave. and 176th St., for Stanton Builders, c/o architect. $300,000.

O., East Cleveland (br. Cleveland)—W. F. Panke, Hudson, taking bids 3 story, basement, brick, Chapman Ave. $150,000. R. H. Hinsdale, Erie Bldg., Cleveland, archt.

CONTRACTS AWARDED

Ark., Hot Springs—Arlington Hotel Co., c/o W. E. Chester, pres., 7 story, rein.-con., brick addition to hotel, garage, separate contracts. E. J. Stern, A. O. U. W. Bldg., Little Rock, archt.

La., Monroe—W. C. Hedrick, archt., 1st Natl. Bank Bldg., Ft. Worth, Tex., general contract 11 story, 70 x 172 ft. rein.-con., wood pile found., for Jackson-Harrison Co., Monroe, to Ashton Glassel, Shreveport, $444,090; electric wiring, to E. Freeman, 713 St. Charles St., New Orleans, $33,445; heating and plumbing, to W. J. Riley, Monroe, $103,661. Grand total $582,096. Noted June 12.

N. J., Jersey City—F. G. Hasselman & A. J. Zerman, archts., 34 Prospect St., East Orange, 12 story, basement, 100 x 105 ft., brick, steel, Gifford Ave. and Hudson Blvd., separate contracts, for Gifford Realty Co.; c/o architects. $750,000.

N. J., Newark—Tenro Development Co., Inc., 804 South 11th St., 5 story, basement, brick, steel apartment, stores, Lyons Ave., separate contracts. $150,000. A. J. Silberstein, 868 Broad St., archt.

N. Y., Brooklyn—Avenue T Holding Corp., H. Dansky, secy., 6 story, 85 x 100 ft., Brightwater Court and Lakeland Ave., separate contracts. $250,000. M. N. Weinstein, 93 Court St., archt.

N. Y., Brooklyn — Ashford Plumbing Co., 567 Ashford St., 6 story, 110 x 132 ft. apartment, Ocean Parkway and Cortelyou Rd., separate contracts. $200,000. Malkind & Weinstein, 93 Court St., archts.

N. Y., Brooklyn—B. Braunheim, 210 Ocean Parkway, 6 story, 80 x 100 ft., Ridge Blvd. and 93rd St., separate contracts. $175,000. Shampan & Shampan, 188 Montague St., archts.

N. Y., New York—Saulmack Realty Co., 1830 Bway., 6 story apartment, Summit Ave. and 165th St., separate contracts. $300,000. Gronenberg & Leuchtag, 110 West 34th St., archts.

N. Y., New York — J. Diamond, 2000 Vyse Ave., 6 story, 104 x 149 ft., Parker and Rosewood Aves., separate contracts. $300,000. J. Bleich, 2000 Vyse Ave., archt.

N. Y., New York—Fifty Grove Street Corp., 17 East 42nd St., 10 story apartment, 311 Bleeker St., separate contracts. $300,000. E. Roth, 1440 Bway., archt.

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N. Y., New York—R. F. L. Building Co., G. Halpern, pres., 414 East 204th St., 6 story, 86 x 127 ft. apartment, Featherbed Lane and Davidson Ave., separate contracts. $190,000. G. W. Swiller, 4215 3rd Ave., archt.

N. Y., New York — Leonel Realty Co., 4409 Albany Post Rd., 6 story, Cayuga Ave. and 246th St., separate contracts. $250,000. L. R. Uffner, 202 West 40th St., archt.

N. Y., New York—B. Stillman Constr. Co., 2419 Webster Ave., 6 story, 126 x 162 ft., and 6 story, 124 x 143 ft. apartment, 153rd St. and Gerard Ave., separate contracts. N. Rotholz, 2419 Webster Ave., archt.

N. Y., New York — Two Hundred Thirty-Eight Oxford Constr. Co., c/o A. Greenberg, 51 East 42nd St., 6 story, Johnson Ave., 238th and Oxford Sts., separate contracts. $300,000. W. C. Sommerfield, 31 Union Sq., archt.

CLUBS

PROPOSED WORK

Calif., Long Beach—Arthur L. Peterson Post, American Legion, sketches by Schilling & Schilling, Farmers & Merchants Bank Bldg., 2 story, 104 x 109 ft., rein.-con., 5th St. and Atlantic Ave.; $150,000 funds to be raised soon for same.

Conn., New Haven—Y.M.H.A., H. Jacobs, 57 Church St., brick, steel association building. To exceed $150,000. Engineer and architect not selected.

N. J., Hackensack—Womens Club of Hackensack, 359 Union St., remodeling and constructing 3 story, basement addition, Union St. $150,000. Noted May 15.

N. Y., New York—Beach Realty Corp., J. A. Murphy, pres., 7 West 170th St., sketches by J. J. Dunnigan, 177th St. and Longstreet Ave., 3 story, 91 x 195 ft. club and locker rooms, 177th St. and Longstreet Ave. $350,000.

N. Y., New York—Cosmopolitan Club, 133 East 40th St., 52 x 100 ft. club, 122 East 66th St. To exceed $150,000.

N. Y., New York — Children's Aid Society, 105 East 22nd St., 4 story club, 301 East 52nd St. $250,000. Project in abeyance. Noted June 5.

BIDS ASKED

N. J., Irvington (br. Newark)—A. M. Kleeman, archt., 987 Springfield Ave., bids about July 1, general and separate contracts 2 story, basement, 60 x 100 ft., brick, steel, incl. gymnasium, bowling alleys, 40th St., for Irvington Amateur Athletic Assn. 23 Myrtle Ave. $150,000. Noted June 12.

CONTRACTS AWARDED

N. Y., New Rochelle—Y. M. C. A., Burling Lane, Y. M. C. A. building, to Eyrich & Ward, 40 East 49th St., New York. Est. $500,000. Noted Mar. 27.

O., Steubenville—Masonic Assn., Steubenville, general contract 3 story, basement masonic temple, to Guy Johnson Co., Steubenville, $250,000.

HOSPITALS

PROPOSED WORK

Ill., Danville—Lakeview Hospital Assn., G. Hoff, pres., 912 North Logan Ave., sketches by Liese & Ludwick, 618 Temple Bldg., 3 story, 50 x 140 ft., rein.-con., brick addition, known as Harrison Memorial Wing, 800 North Logan St. $200,000.

N. J., Lakewood—Lakewood Milk & Rest Cure, Inc., 154 Nassau St., New York, sketches by H. Ginsberg, 205 East 42nd St., New York, 2 story, basement, brick, steel sanitarium, hotel. $300,000.

N. Y., New York—Home for Hebrew Infants sketches by Necarsulmer & Lehlbach, 420 Lexington Ave., 4 story clinic and infant observation hospital, University Ave. and Kingsbridge Rd. $150,000.

O., Dayton—Schenck & Williams, archts., 3rd Natl. Bldg., bids late in July, 4 story, basement, brick, rein.-con. hospital, nurses home, and service quarters, plain founds., Fairview Ave. for Good Samaritan Hospital Assn., J. Q. Sherman, chn. $1,500,000.

Va., Richmond — Virginia Home for Incurables, Robinson and Broad Sts., soon takes bids 7 story, brick, Appomattox and Powhatan Sts. $300,000. Baskerville & Lambert, Central Natl. Bank Bldg., archts.

BIDS ASKED

Mass., Springfield—City, c/o Kirkham & Parlett, archts., 25 Harrison Ave., bids about July 1, 3, 4, 5 story, basement, 40 x 115 ft. and 40 x 190 ft., brick, steel isolation hospital addition, plain found., State St. $500,000. Noted June 26.

CONTRACTS AWARDED

Ariz., Phoenix—Good Samaritan Hospital, 4 story, 44 x 155 ft. addition, to W. Peper, Phoenix, $112,500.

Mass., Fall River—Truesdale Hospital, D. S. Jones, 1820 Highland Ave., 3 story, basement, 45 x 142 ft., brick, steel nurses home, to Carey Quarry & Constr. Co., 56 North Main St., est. $150,000; heating and ventilating, to Fall River Steam & Gas Pipe Co., 205 Bedford St.; plumbing, to N. Miller & Sons, Fall River; and electrical work, to Chace Electric Co., Fall River, total est. $25,000. Noted June 5.

Mich., Northville—Wm. H. Maybury Sanitorium, brick, steel, rein.-con. sanitorium addition, incl. ambulatory building, power house plain founds., to W. E. Wood Co., Union Trust Bldg., Detroit, $388,500.

Ont., Mimico — Dpt. P. Wks., Parliament Bldgs., Toronto, 3 story, basement, 40 x 123 ft., concrete, brick, steel nurses building in connection with Ontario Hospital, to H. N. Dancy & Son, 22 College St., Toronto; 75 x 120 ft., concrete, brick, steel laundry, to Herod Constr. Co., Mimico. Est. $160,000.

CHURCHES

PROPOSED WORK

Ky., Covington—Methodist Episcopal Church, 10th and Russell Sts. soon lets contract 2 story, basement, brick, stone, plain found., Madison St. $200,000. Bureau of Architecture, 1701 Arch St., Phila., Pa., archts.

Mass., Boston—New Old South Church, F. D. Putnam, treas., Statler Bldg., sketches by Allen & Collens, 75 Newbury St., altering and constructing parish house addition, Boylston and Dartmouth Sts. $150,000.

Mass., Weymouth—Trinity Episcopal Church, W. Hyde, pastor, new sketches by C. C. Coveney, 184 Boylston St., Boston, 1 and 2 story, brick, granite church, parish house. $150,000 or more. Noted Dec. 19.

R. I., Providence — St. Mathew's Roman Catholic Parish, c/o A. J. Murphy, archt., 25 Fenner St., soon takes bids 1 and 2 story, basement, brick, stone church, parochial school, plain founds., Park and Elmwood Aves. $160,000.

BIDS ASKED

N. J., Highland Park—A. Merchant, archt., 1 Elm Row, New Brunswick, bids about July 8, altering and constructing 2 story, basement, brick, steel, addition, for Highland Park Baptist Church, c/o architect. Noted June 27.

N. J., Mendham—R. J. Reilly, archt., 10 East 41st St., New York, bids about July 15, general contract 2 story, basement, brick, steel church, school, for Christian Charities Society, c/o architect. $150,000. Noted May 8.

N. J., Newark—R. Norden, archt., 207 Market St., bids about Aug. 1, general contract altering and constructing 2 story, basement, 80 x 100 ft., brick, steel church and Sunday school addition, Roseville and Sussex Aves., for Roseville Presbyterian Church. $150,000. Noted June 19.

N. J., Ridgefield Park—J. S. Piggott, archt., 42 Walnut St., Newark, bids about July 15, general contract 1 story, basement, 110 x 155 ft., brick, steel, granite, Mount Vernon St. and Euclid Ave., for St. Francis Roman Catholic Church, J. J. Butcher, pastor, 114 Mt. Vernon St. $250,000. Noted June 26.

CONTRACTS AWARDED

Ind., Indianapolis — All Souls Unitarian Church, 1453 North Alabama St., general contract brick, steel, to Brandt Bros., 611 Architects Bldg. Est. $150,000. Noted May 22.

N. Y., New York—Church Eng. Co. (contractors), 101 Park Ave., awarded contract 1,000 tons steel for church, apartments, to Eastern Structural Steel Co., Easton, Pa., for Madison Avenue-31st Street Corp. and Madison Baptist Church. Noted Mar. 27 under "Contracts Awarded."

Wis., Cudahy — Holy Family Catholic Congregation, excav., concrete masonry contract for 1 story, 73 x 128 ft., stone, steel, brick Underwood and Swift Sts., to Pocholski & Doligalski, 448 Mitchell St., Milwaukee; carpentry work, to Polasek Bros., 501 Armour Ave.; cut stone, to Vallbrecht Cut Stone Co., 753 South Canal St.; structural steel, to C. Hennecke Co., 1353 North Pierce St.

Wis., Kenosha—St. Mary's Catholic Congregation, general contract 1 and 2 story, basement, 128 x 135 ft., church, school, 40th Ave., to McQuestion & Propson, 7408 28th Ave.

SCHOOLS

PROPOSED WORK

Conn., Suffield—Suffield School, Bd. Trustees, school expansion, incl. dormitory, laboratory, classroom building additions and gymnasium. $1,000,000. Engineer and architect not selected.

Mass., Cambridge—Harvard University, A. L. Lowell, pres., revised plans by Coolidge, Shepley, Bulfinch & Abbott, Ames Bldg., Boston, 3 story, basement, brick, stone, steel biological institution buildings, plain founds., Oxford St. and Divinity Ave. $5,000,000. Noted Feb. 27.

Mo., St. Louis — St. Louis University, 221 North Grand Blvd., plans by H. P. Hess, 1001 Ambassador Bldg., 4 story, basement, rein.-con., brick building for Commerce and Finance Dpt., Lindell St. west of Grand Blvd. $250,000.

N. H., Berlin—City, W. R. Brown, chn. com., plans by Wells & Hudson, Hanover, altering and constructing 1 and 2 story, basement, brick high school addition, incl. gymnasium. $150,000.

N. J., Freehold—Bd. Educ., W. Throckmorton, pres., Junior High School, 2 story, basement, brick, steel, rein.-con., plain found. $150,000. Engineer and architect not selected.

N. J., Kearny (sta. Arlington)—St. Cecelia's Roman Catholic Church, J. Preston, pastor, Kearny, revised plans 2 story, basement, brick, steel, rein.-con., Chestnut St. $150,000. Myers & Shanley, 24 Walnut St., Newark, archts. Noted June 12.

Schools (Continued)

N. J., Keansburg—St. Anne's Roman Catholic School, sketches by V. J. Eck, 12 Broad St., Red Bank, 2 story, basement, brick, steel, Carr Ave. $150,000.

N. J., Passaic—Bd. Educ., Hobart Bldg., high school addition. $1,000,000. Project in abeyance.

N. J., Summit—Bd. Educ., 272 Morris Ave., sketches by Guilbert & Betelle, 20 Branford Pl., Newark, 2 story, basement, brick, steel addition to Franklin School, Blackburn Rd. $150,000. Noted June 27.

N. J., Westfield—Bd. Educ., Clark St., 2 story, basement, brick, steel addition, plain found., Osborn Ave. $150,000. Engineer and architect not selected.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, school, Avenue U and East 64th St., $415,000; and gymnasium and auditorium addition to P. S. 101, Benson Ave. and 24th St., $200,000.

N. Y., Douglaston—Bd. Educ., 500 Park Ave., New York, plans by W. J. Martin, Flatbush Ave. extension and Concord St., Brooklyn, P. S. 38, Douglaston Blvd. and McNight Dr. $500,000.

N. Y., New York—Bd. Educ., 500 Park Ave., plans by W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, Samuel Gompers Industrial High School, East 145th St. and Tinton Ave. $1,600,000.

O., Massillon—Congregation of Precious Blood, A. Ignatius Wagner, pastor, Carthagena, plans by W. Koehl, 1900 Euclid Bldg., Cleveland, 3 story, basement, brick, steel, concrete college, near here. $200,000. Noted May 15.

R. I., Providence—Rhode Island School for Deaf, A. C. Hurd, principal, c/o W. R. Walker & Son, archts., 49 Weybosset St., 2 story, basement, brick school for deaf, 520 Hope St. $150,000.

R. I., Providence—See "Churches."

Pa., Grove City—Grove City College, plans by W. G. Eckles, Lawrence Savings & Trust Bldg., New Castle, 3 story, brick, hollow tile, steel dormitory, $200,000.

Va., Richmond—University of Virginia, law building, alumnus, nurses home, Cobb Chemical Laboratory wing, on campus, $700,000.

BIDS ASKED

Conn., New Milford—July 10, by Town, J. Pettibone, supt., Junior and Senior High School, 2 story, basement, brick, stone, plain found. $150,000. Towner & Sellew, 363 Main St., Middletown, archts. Noted June 26.

Ind., Columbia—July 10, by School Comrs., Whitney Co., brick, steel, stone school, $150,000. Henkel & Hanson, Connersville, archts.

La., Monroe—July 5, by Bd. Educ. Ouachita Parish School brick addition to high school. J. W. Smith & Associates, Monroe, archts.

Mass., Billerica — July 7, by Town, M. A. Buck, chn. com., 2 story, basement, 20 room, brick, stone high school addition, plain found., Boston Post Rd. $150,000 or more. E. I. Leeds, 216 Tremont St., Boston, archts. Noted June 19.

Mass., Dennis—July 8, by Town, G. Chapman, School Building Com., 3 story, basement, 80 x 95 ft., brick school, South Dennis Sect. $150,000. Haynes & Mason, 280 Main St., Fitchburg, archts. Noted June 19.

Mass., Medford (br. Boston)—City, A. Harty, chn. Building Com., bids about July 1, altering and constructing 3 story, basement, brick, high school addition, plain found., Forest St. $150,000. C. B. Dunham, 6 Beacon St., Boston, archts. Noted June 26.

Mich., Hamtramck (br. Detroit)—July 11, by S. A. Majewski, supt. Bd. Educ., Junior High School, 2 story, basement, brick, rein.-con., steel, stone, plain found., Charest St. $300,000. B. C. Wetzel & Co., 2317 Dime Bank Bldg., Detroit, archts.

N. J., Clifton—Bd. Educ., High School Bldg., bids about Aug. 1, altering and constructing 2 story, basement, brick, steel addition, Clifton Ave. $250,000. Lee & Hewitt, 152 Market St., Paterson, archts. Noted June 19.

N. J., Fort Lee—Bd. Educ., J. F. Whittaker, pres., High School, bids about Aug. 1, 2 story, basement, brick, steel, rein.-con. addition to School 4, Palisade Ave. $150,000. Hacker & Hacker, 201 Main St., archts. Noted Dec. 12.

N. J., Irvington (br. Newark)—Bd. Educ., 1253 Clinton Ave., bids about Aug. 1, general contract altering and constructing 2 story, basement, brick, steel addition, Grove St. $170,000. Schneider, Kleeman & Werther, 1007 Broad St., Newark, archts. Noted June 27.

N. J., Lakewood—Bd. Educ. bids about Aug. 1, 2 story, basement, brick, steel school. $150,000. C. B. Cook, Asbury Park Trust Bldg., Asbury Park, archts. Noted June 19.

N. J., New Brunswick—Bd. Educ., Livingston Ave., bids about Aug. 15, 2 story, basement, brick, steel, rein.-con. addition to Senior High School, Livingston St. $150,000. A. Merchant, 1 Elm Row, archt. Noted June 19.

N. J., Plainfield — J. S. Piggott, archt., 42 Walnut St., Newark, bids about Aug. 1, general contract, basement, brick, steel, rein.-con., Liberty St., for St. Mary's Roman Catholic Church. P. A. Maher, pastor, 516 West 6th St. Est. $300,000. Noted June 12.

N. J., Ridgewood—Bd. Educ., J. Kollmar, secy., 1 Franklin Ave., bids about Aug. 1, 2 story, basement, brick, steel, rein.-con. addition to Junior High School, East Ridgewood Ave. $450,000. Fanning & Shaw, 49 Ward St., Paterson, archts. Noted June 19.

N. J., Rutherford—Bd. Educ., High School Bldg., bids about Aug. 15, 2 story, basement, brick, steel addition to Lincoln School, Montross Ave. $150,000. E. I. Williams, 131 West Passaic Ave., archt. Noted June 12.

O., Shaker Heights (br. Cleveland)—July 19, by Bd. Educ., J. W. Main, clk., Senior High School, 2 story, basement, 300 x 400 ft., brick, steel, concrete, Onaway Dr. $1,125,000. Hubbell & Benes Co., 4500 Euclid Ave., Cleveland, archts. Noted Nov. 21.

Pa., Beaverdale—July 7, by Bd. Educ., Summerhill Twp., J. A. Boncher, pres., 2 story, 70 x 156 ft., brick elementary and high school building, incl. lunch room, gymnasium, locker rooms, cafeteria. $150,000. H. M. Rogers, Johnstown Trust Bldg., Johnstown, archt. Vans Eng. Serv., Blairsville, engrs.

Pa., Rankin—July 7, by Bd. Educ., E. Katz, pres., 3 story, basement, 70 x 102 ft., brick, hollow tile, school, incl. office, gymnasium, doctors and nurses rooms. $210,000. W. P. Hutchins, Empire Bldg., Pittsburgh, archt.

R. I., Pawtucket—July 8, by City, W. A. Newell, supt. schools, and Monahan & Meikle, archts., 255 Main St., Junior High School, 3 story, basement, brick, stone, concrete, steel, plain found., Newport Ave., $500,000; heating and ventilating, est. exceeds $25,000; plumbing, $25,000 or more; electrical work, $25,000.

R. I., Providence—July 14, by City, J. E. Dunne, mayor, at office of City Clerk, City Hall, Junior High School, 2 story, basement, brick, stone, steel, plain found., Thurbers and Prairie Aves. To exceed $150,000. T. J. H. Pierce, Industrial Trust Bldg., archt. Noted Feb. 27.

Tenn., Memphis—July 12, by State Bd. Educ., Nashville, 3 story, 70 x 190 ft., brick, stone science building, for State Teachers College, $225,000. G. Maham, Jr., Amer. Bank Bldg., archt. Noted Apr. 10.

Tex., Abilene—July 7, by State Bd. Control, Austin, 2 story, fireproof women's dormitory, at Abilene State Hospital. David S. Castle Co., Abilene, archts. and engrs.

Va., Richmond—St. Josephs Orphanage taking bids brick, terra cotta, stone, tile buildings on 250 acre tract at Hollybrook, near here. $1,000,000. Carneal, Johnson & Wright, Electric Bldg., archts. Contract for central heating plant at orphanage awarded to C. Boehling Co., Richmond. Noted May 29.

CONTRACTS AWARDED

Ark., Fayetteville—Bd. Educ., general contract two 2 story, brick, concrete schools, to E. V. Bird Constr. Co., Fayetteville, $134,100; heating and plumbing, to W. Duggans, Fayetteville, $26,.51.

Calif., Newport Beach — Newport-Costa Mesa Union High School Dist., 1 and 2 story, 180 x 291 ft., rein.-con., steel, ornamental wrought iron, Irvine Blvd. and 15th St., Costa Mesa, to W. J. Shirley, 1351 West Washington St., $166,609.

Conn., New Haven — Yale University, constructing Payne Whitney Memorial Gymnasium, pools, etc., to Marc Eidlitz & Son, 41 East 42nd St., New York. Est. $6,000,000.

Md., Baltimore — Mayor and City Council, City Hall, altering and constructing 1 and 2 story, basement, 74 x 194 ft., brick, steel, concrete addition, to P. C. Streett Eng. Co., 404 St. Paul St., $161,700. Noted June 12.

Mass., Boston—Gordon College of Theology & Missions, Evans Way, altering and constructing 3 story, basement, brick addition, plain found., Evans Way, to Wm. Coulson Co., 288 Main St., Cambridge. Est. $150,000.

Mass., Cambridge—City, J. J. Terry, supt. P. Buildings, 3 story, basement, irregular sized, brick, limestone, steel, plain found., to Rugo Constr. Co., 80 Boylston St., Boston, $349,300; plumbing, to W. M. Collins Co., 150 Tyler St., Boston, $24,653; electrical work, to Federal Electric Contg. Co., 99 Bedford St., Boston, $22,800; heating and ventilating, to P. J. Murphy Co., 8 Walden St., Cambridge, $58,400. Grand total $455,153. Noted Mar. 27.

Mass., Lexington—Town, Bd. Selectmen, 2 story, basement, irregular sized, brick, stone, plain found., to Vappi & Ferguson Co., 515 Mass. Ave., Cambridge, $107,500. Noted June 19.

Mass., Revere (br. Boston)—Building Com., City Hall, 3 story, basement, 70 x 155 ft., brick, stone, steel, addition to Abraham Lincoln School, plain found., to Frankini Bros. Co., 30 Mystic Ave., Medford, $152,000. Noted June 12.

Mass., Watertown — Town, Bd. Selectmen, altering and constructing 2 story, basement, brick, steel addition, plain found., Carrol St., to D'Amore Constr. Co., 89 State St., Boston. Est. $150,000. Noted June 5.

Mo., Kansas City—County Day School, 5100 Wyoming Bldg., 2 story, basement, 45 x 133 ft., brick, rein.-con., 57th St. and state line, to McCandlers Building Co., 400 Victor Bldg. Est. $150,000.

Mont., Glendive — Dawson Co., c/o L. T. Elliott, clk., general contract 3 story, basement, 140 x 175 ft., rein.-con., brick addition, to J. C. Boespflug, Miles City, $171,256. Noted Dec. 5.

N. J., Imlaystown—Bd. Educ., general contract 1 story, basement school, to W. Hancock, Main St., Hightstown, st. $150,000.

N. J., Irvington (br. Newark)—Bd. Educ., 1235 Clinton Ave., general contract 3 story, basement, 128 x 235 ft., brick, steel, to F. D. Trainer & Son, Inc., 12 Smith St., $356,000; plumbing, to Ruhl & Hatfield, Inc., 384 South 10th St., Newark, $22,120; heating, to J. H. Nelles Co., 835 Springfield Ave., $38,280. Grand total $426,900. Noted May 8.

N. Y., Ithaca — Cornell University Law School, "Myron Taylor Hall," 2 story, basement, brick, to G. A. Fuller, 57th St. and Madison Ave., New York. Noted May 22.

N. D., Fargo—State Bd. Administration, E. G. Wanner, secy., Bismarck, general contract rein.-con., brick physical education auditorium, incl. swimming pool, at Agricultural College, to T. F. Powers Constr. Co., 419 8th St. N., $152,851. Noted May 29.

O., Akron—M. M. Konarski, archt. and engr., Central High School, for Alvin C. Voris School, 3 story, incl. basement, 42 x 320 ft., brick, terra cotta, rein.-con., incl. gymnasium, auditorium, to John Nadalin & Co., Bond Hotel, $222,355. Sst. $275,000. Noted May 21.

Pa., Erie—Bd. Educ., Jefferson School, 2 story, basement, 110 x 240 ft., brick, steel, tile, limestone, 35th St. and Copper Rd., to Upton & Lang, Commerce Bldg., $187,000. Noted May 1.

Tenn., Chattanooga—Bd. Educ., North Chattanooga Junior-Senior High School, to J. Parks, $138,866. Plumbing and heating, to W. R. Spivey Co., Dayton, $16,960; lighting, to Terrell Electric Co., $4,652.

Utah, Provo—School Bd., West Junior High School, to Cox & Christiansen, Provo, $85,000. East Junior High School, to Tolboe Co., Provo, $92,400. Noted June 19.

Va., Richmond—Virginia Polytechnic Institute, J. A. Burruss, pres., mechanical engineering laboratory, to D. J. Phipps, Roanoke, $250,000; dairy husbandry building, to Northeastern Constr. Co., Greensboro, N. C., $150,000. Noted May 1.

THEATRES

PROPOSED WORK

Conn., Torrington — Warner Bros. Pictures, Inc., 321 West 44th St., New York, plans by T. W. Lamb, 644 8th Ave., New York, theatre, 70 Main St. To exceed $150,000.

Ill., Chicago—Publix-Balaban & Katz Theatre Co., 175 North State St., sketches by Rapp & Rapp, 190 North State St., theatre, 63rd St. and Wallace Ave. $1,500,000.

Kan., Hutchinson — Midland Court Theatres, 610 Midland Bldg., Kansas City, Mo., plans by Boller Bros., 110 West 10th St., Kansas City, Mo., rein.-con., brick, steel, terra cotta, $400,000.

Mich., Detroit — R. K. O. Theatres, 1564 Bway., New York, soon lets contract altering theatre. $275,000. J. Eberson, 370 Lexington Ave., New York, archt.

N. Y., New York—Seven Hundred Fifty-Five 7th Avenue Corp., 755 7th Ave., plans by G. Keister, 56 West 45th St., theatre, 7th Ave. To exceed $1,000,000. Earl Carroll Theatres, 775 7th Ave., lessee.

O., Cincinnati — J. Eberson, archt., 370 Lexington Ave., New York, soon lets contract 2 story, basement, 208 x 252 ft., brick, rein.-con. theatre, plain found., McMillan St., for Publix Ohio Corp., c/o architect. $1,000,000.

O., Toledo—R. K. O. Theatres, 1564 Bway., New York, soon lets contract theatre. To exceed $250,000. J. Eberson, 370 Lexington Ave., New York, archt.

Pa., Wilkinsburg—Warner Brothers Theatres, 231 West 44th St., New York, revised plans by J. Eberson, 370 Lexington Ave., New York, and bids latter part July, theatre.

BIDS ASKED

La., Lafayette—Southern Amusement Co. bids about July 15, 1 story, mezzanine, balcony, 1,200 seating capacity. H. J. Duncan, Alexandria, archt.

Mich., Bay City—C. Howard Crane, archt., 1001 Fox Theatre Bldg., Detroit, taking bids altering and constructing 2 story, basement, brick, rein.-con., steel addition plain found., for W. S. Butterfield Theatres, Inc., 159 East Elizabeth St., Detroit. $250,000.

N. J., Newark—Warner Bros., 321 West 44th St., New York, bids about July 15, general contract 1 story, basement, brick, steel, rein.-con., plain found. $1,000,000. J. Eberson, 370 Lexington Ave., New York, archts. Noted May 1.

N. J., Perth Amboy—Warner Bros., 321 West 44th St., New York, bids about July 15, general contract theatre. To exceed $150,000. J. Eberson, 370 Lexington Ave., New York, archt.

N. Y., Albany—Aug. 1, by R. K. O. Theatres, 1564 Bway., New York, theatre, North Pearl St. and Clinton Ave. $3,000,000. J. Eberson, 370 Lexington Ave., New York, archt. Noted June 19.

N. Y., Schenectady—R.K.O. Theatres, 1564 Bway., New York, bids about Aug. 1, general contract theatre. To exceed $150,000. J. Eberson, 370 Lexington Ave., New York, archt.

CONTRACTS AWARDED

N. Y., New York—J. D. Rockefeller, Jr., and Metropolitan Square Corp., 61 Bway., amusement and concrete center, incl. theatre, concert halls, broadcasting stations, studios, 5th to 6th Aves., 48th to 51st Sts., to Todd & Robertson, Inc., 347 Madison Ave. Est. $250,000,000. Noted Sept. 3.

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BANKS

PROPOSED WORK

Mass., Medford (br. Boston)—Medford Co-operative Bank, M. Thompson, treas., sketches by H. A. Goodspeed, 148 State St., Boston. 2 story, basement. High St. $150,000. Noted May 22.

N. Y., Bayshore—South Side Bank, Main St., soon takes bids general contract 2 story, incl. office. Main St. $150,00. Morgan French & Co., 19 West 44th St., New York, archts.

N. J., Stone Harbor—I. H. Glaser, archt., 620 Madison Ave., New York, bids about November, general contract 1 story, basement, brick, steel, plain found., for 1st Natl. Bank, H. I. Taylor, pres. $200,000. Noted Apr. 3.

BIDS ASKED

Ill., Chicago — Chatfield Trust & Savings Bank, 7906 Cottage Grove Ave., taking bids 2 and 3 story, 50 x 125 ft., 7938 Cottage Grove Ave. $350,000. Meyer & Cook, 820 Tower Court, archts. Noted June 5.

Mass., Lowell — Appleton Natl. Bank, 174 Central St., taking bids altering 1 and 2 story, basement, brick, stone, concrete, steel, Central St. $150,000. J. W. Beal Sons Co., 185 Devonshire St., Boston, archts.

Mich., Battle Creek—July 9, by Holabird & Root, 333 North Michigan Ave., Chicago, Ill., 24 story, basemet, brick, rein.-con., stone, steel, terra cotta, incl. office, McCanly, State and Michigan Sts., for Central National Bank. $1,500,000. Noted May 29.

N. J., Secaucus—W. Weir, archt., 254 Summit Ave., Union City, taking bids general contract altering and constructing 2 story basement addition, for 1st Natl. Bank. $150,000.

CONTRACTS AWARDED

Pa., Phila. — Girard Trust Co., Broad and Chestnut Sts., 34 story bank and office, to United Engineers & Constructors, 112 North Broad St. Est. exceed $1,000,000. Contractors taking bids on structural steel. Noted May 29.

O., Cleveland—Guardian Trust Co., W. D. Purdon, vice pres., 623 Euclid Ave., 1 and 2 story, stone, concrete, steel, incl. store, to George L. Craig, Inc., 4614 Prospect Ave. Est. $150,000. Noted May 15.

OFFICES

PROPOSED WORK

Calif., Los Angeles—C. Mac Quarrie, 1779 North Highland Ave., sketches 3 story, basement, 60 x 150 ft., rein.-con., stucco, Franklin St. and Highland Ave. $185,000. Engineer and architect not selected.

N. J., Palisades Park—Owner, c/o P. J. Jossier, archt., 240 Broad Ave., sketches 2 story, basement, brick, steel, incl. stores, apartments, Broad Ave., $150,000.

N. Y., Brooklyn—M. E. O'Donnell, 44 East 17th St., 4 story, 57 x 100 ft. office, Ocean and Church Aves. $150,000. **Maturity about December.** Slee & Bryson, 16 Court St., archts. Noted June 5.

N. Y., New York—C. R. Lee, 410 Riverside Dr., plans by Sugarman & Berger, 345 Madison Ave., 4 story office, storage, loft. $150,000.

N. Y., New York—L. E. Kleban & Sons, 1440 Bway., plans by E. Roth, 1440 Bway., 22 story, 46 x 75 ft., brick, incl. stores, 361 7th Ave., $700,000.

N. Y., New York—Platt Holding Corp., J. Kavacs, pres., 17 East 42nd St., sketches by L. A. Abramson, 25 West 45th St., 35 story, 123 x 167 ft., brick, incl. stores, Pearl, Platt and John Sts. $3,000,000.

BIDS ASKED

Minn., St. Paul—See "Contracts Awarded."

N. J., Montclair—J. C. Schaeffler, archt., 52 Vanderbilt Ave., New York, taking bids 2 story, basement, brick, steel, incl. store, Church St., for A. F. Co., c/o architect. $150,000.

N. J., Woodbridge—Owner, c/o E. Wierzbicki, archt., 175 Smith St., Perth Amboy, bids about Aug. 1, general contract 2 story, basement, 40 x 125 ft., brick, steel, incl. stores, $150,000. Noted June 19.

N. Y., New York—See "Contracts Awarded."

CONTRACTS AWARDED

Minn., St. Paul—Northern States Power Co., 15 South 5th St., Minneapolis, and St. Paul, 6 story (ultimately 12 story), 2 basements, 75 x 167 ft., brick, stone, steel, rein.-con., 100,000 sq.ft. floor space, own forces. Byllesby Eng. & Management Corp., 231 South LaSalle St., Chicago, Ill., engrs. Noted June 4.

N. J., Montclair—J. A. Gabriel Aiello, c/o Holmes & Von Schmid, archt., 42 Church St., general contract 2 story, basement, brick, steel, incl. stores, to W. W. Cole, 18 Cottage Pl., Newark. Est. $150,000. Noted June 12.

N. Y., New York—Equitable Life Assurance Society, 22 story office, stores, 7th Ave. and 32nd St., to Thompson Starrett Co., 250 Park Ave. Est. exceeds. $1,000,000.

N. Y., New York — Grand Central Constr. Co., I. Judis, pres., 271 Madison Ave., 30 story office, 3rd Ave. and 44th St., separate contracts. $800,000. E. J. Kahn, 2 Park Ave., archts. Noted June 19.

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STORES

PROPOSED WORK

N. J., Paterson—Owner, c/o E. R. Coe, archt., 136 Washington St., 3 story, basement, 75 x 120 ft., brick, steel stores, apartments, plain found. $150,000. Noted June 27.

BIDS ASKED

N. J., Perth Amboy—J. N. Pierson & Son, archts., 198 Jefferson St., taking bids 2 story, basement department store addition, South St., for Reynolds Bros., 136 Smith St. $150,000. Noted June 5.

N. Y., Brooklyn—See "Contracts Awarded."

CONTRACTS AWARDED

N. Y., Brooklyn — Kings Rugby Corp., A. Halperin, pres., 26 Court St., 4 story stores, apartments, East 55th St. and Clarkson Ave., separate contracts. $150,000. Cohn Bros., 1361 Stone Ave., archt.

Pa., Phila. — J. G. McCrory Corp., 1107 Bway., New York, 2 story, basement, 84 x 150 ft., granite, steel, concrete, to Minton-Scobell Co., The Arcade, Cleveland, O. Est. $150,000.

LOFTS

PROPOSED WORK

N. J., Jersey City—Loran Building Corp., B. Goldberg, pres., c/o Schlossberg & Gluckman, 915 Bergen Ave., will not build loft, stores, 75-85 Monticello Ave. $150,000. Project abandoned. Noted May 1.

PUBLIC

PROPOSED WORK

Calif., Los Angeles—JAIL—City soon takes bids 4 story, basement, 45 x 200 ft. and 45 x 110 ft., T shaped, rein.-con., hollow tile, steel. Avenue 19; $300,00. Los Angeles Constr. Dept., C. O. Brittain, supt., City Hall, engrs. Noted June 5.

N. J., Bayonne — MUNICIPAL — Bd. City Comrs., W. P. Lee, city clk., City Hall, revised plans by P. A. Vivarttas, 110 48th St., Union City, 4 story, basement, brick, steel, rein.-con., Avenue C between 27th and 28th Sts. $1,500,000. Noted May 15.

BIDS ASKED

Ill., Highland Park—LIBRARY—July 15, by Holmes & Flinn, archts., 6 South Dearborn St., Chicago, 1 and 2 story, Wisconsin stone and Indiana limestone, for City. $150,000. Noted May 22.

N. J., Raritan — TOWNSHIP HALL — Bd. Town Council, Twp. Hall, bids about Aug. 1, 3 story, basement, 50 x 125 ft., brick, steel, Woodbridge and Plainfield Aves. $150,000. A. Merchant, 1 Elm Row, New Brunswick, archt. Noted May 15.

N. J., Freehold—COURT HOUSE—July 23, by Bd. Freeholders Monmouth Co., Court House, addition to court house. $350,000. L. Cubberley, Long Branch, archt. Noted May 29.

N. Y., Rochester—ALMSHOUSE and HOSPITAL—Bd. Supervs. Monroe Co., bids about July 3, almshouse, hospital. $3,300,000. C. A. Smith, clk.

Tex., Andrews—JAIL—July 14, by Andrews Co., c/o J. D. Mathews, judge, 2 story, 35 x 46 ft., rein.-con., brick, hollow tile, Voelker & Dixon, 207 Perkins Bldg., Wichita Falls, archts.

CONTRACTS AWARDED

Conn., Mansfield — DORMITORIES — State, Mansfield Training School Bd. Trustees, 2 dormitories, power plant, laundry, brick, at State Training School, to Manchester Constr. Co., 875 Main St., Manchester, $228,916. Noted May 15.

Ind., Marion — CITY HALL — City, general contract rein.-con. city hall, to Bowman Constr. Co., Marion. Est. $150,000. Noted June 12.

Mass., Brookline—FIRE STATION—Town, C. F. Rowley, chn. selectmen, 2 story, basement, brick, steel, concrete, concrete found., to Crane Constr. Co., 80 Boylston St., Boston. Est. $150,000. Noted June 12.

BUILDINGS—UNCLASSIFIED

PROPOSED WORK

Ark., Little Rock — COMMERCIAL — Bale Chevrolet Co., 411 West Capitol St., soon takes bids 2 story, 150 x 200 ft., rein.-con., brick, 2nd St. and Bway. Wittenberg & Delony, Home Insurance Bldg., archts.

Calif., Burbank—STUDIOS, etc.—First National Studios sketches additions, incl. 14 sound stages, 4 story administration building, 2 story restaurant. To exceed $1,000,000.

Conn., Torrington — EXCHANGE — Southern New England Telephone Co., 157 Church St., New Haven, plans by R. W. Foote, 185 Church St., New Haven, 2 story, basement, 100 x 100 ft., brick, steel, marble. $200,000.

Ind., Indianapolis—EXCHANGE—Indiana Bell Telephone Co., 256 North Meridian St., plans by Vonnegut-Bohn & Mueller, 610 Indiana Trust Bldg., 8 story, basement, 100 x 200 ft., rein.-con., stone, New York and Meridian Sts. $1,000,000.

Mass., Needham — POLICE and FIRE STATION—Town, Bd. Selectmen, bids about July 1, 2 story, basement, brick, stone, steel, concrete, plain found., School and Chestnut Sts. $150,000. G. E. Robinson, 80 Federal St., Boston, archt. Noted Apr. 17.

N. J., Freehold—HISTORICAL—Historical Society of Monmouth Co., F. Howell, chn., 2½ story, basement, brick, steel historical home. $150,000. **Engineer and architect not selected.**

N. J., North Bergen—SHOWROOM, WAREHOUSE—C. Eichols, Jr., archt., 960 Bergenline Ave., Union City, soon lets contract 4 story, basement, brick, steel, rein.-con. addition, plain found., Hudson Blvd., Castle Furniture Co., 898 Bergenline Ave., Union City. $150,000. Noted June 19.

N. Y., New York—EXCHANGE—New York Telephone Co., 140 West St., bids in fall, general contract 17 story exchange, 42 Pearl St. Voorhees, Gmelin & Walker, 101 Park Ave., archts. Noted June 19.

O., Cincinnati—EXCHANGE—Cincinnati Bell Telephone Co., East 4th St., plans by H. Hake, 2400 Gilbert Ave., 2 story, basement, brick, rein.-con., plain found., Delta St. $415,000.

O., Cleveland — MAUSOLEUM — Crown Hill Inc., C. W. Beck, treas., Terminal Tower Bldg., plans by Lovell & Lovell, 224 East Ontario St., Chicago, Ill., granite, steel, marble, concrete, Crown Hill Burial Park. $150,000.

BIDS ASKED

Mo., Ferguson—HOME—Mothers & Babies Home of Christian Church, bids probably late in July, 2 story, basement, 100 x 250 ft., brick, concrete, concrete found. $200,000. Hoener Baum & Froese, 3605 Laclede Ave., St. Louis, archts.

N. J., Fort Lee—ADMINISTRATION—G. W. Dexter, archt., 201 Main St., bids about Aug. 1, general contract 2 story, basement, 60 x 120 ft., and 2 story, basement, 70 x 160 ft. administration building and combnied title department building, Lemoine Ave., for Consolidated Film Industries, Inc., Lemoine Ave. $150,000. Noted June 19.

O., Cleveland Heights (br. Cleveland)—COMMERCIAL, etc.—B. D. Roseman, 1929 Taylor Rd., Cleveland, taking bids 3 story, basement, 50 x 150 ft., brick, commercial, apartment, Superior Park Dr. $200,000. M. Weis, Union Bldg., Cleveland, archt.

CONTRACTS AWARDED

Conn., Hartford — EXCHANGE — Southern New England Telephone Co., 157 Church St., New Haven, 6 story, 140 x 160 ft., brick, steel, stone, to Industrial Constr. Co., 721 Main St. Est. $2,000,000. Noted June 12.

N. Y., Mount Kisco — EXCHANGE — New York Telephone Co., 140 West St., New York exchange, to Chapman Kruge Corp., 155 East 42nd St. Est. $250,000.

N. Y., New York—EXCHANGE—New York Telephone Co., 140 West St., exchange and office, Walker and Lispenard Sts., to Marc Eidlitz & Son, 41 East 42nd St. Est. $1,000,000. Separate contracts awarded, foundations in progress.

N. Y., New York—TERMINAL and WAREHOUSE—Starrett Investing Co., 101 Park Ave., 15 story warehouse and terminal, 11th to 13th Aves., 26th and 27th Sts., to Starrett Bros., 101 Park Ave. Est. $7,000,000.

N. Y., Newburgh—EXCHANGE—New York Telephone Co., 140 West St., general contract 2 story exchange, to B. M. Higginson Constr. Co., 240 Bway. Est. $150,000. Noted May 1.

Buildings

FACTORIES AND MILLS

PROPOSED WORK

Fla., Dundee — PACKING PLANT — Dundee Citrus Gorwers Assn., R. W. Smith, plans by Tilden & McMichael, Winter Haven, 1 story, welded steel arch frame packing plant. $40,000.

Ill., Chicago — STORAGE, SOAKING PITS, etc.—Illinois Steel Co., 208 South La Salle St., sketches storage, soaking pits, Brandon Ave. To exceed $150,000.

N. J., Cranbury — FACTORY — Unexcelled Mfg. Co., 22 Park Pl., New York, fireworks factory. To exceed $100,000.

N. J., Teaneck—DISTRIBUTION PLANT—Sheffield Farms Co., Inc., 524 West 57th St., New York, revised plans by F. A. Rooke, 12 East 41st St., New York, altering and constructing 1 story, 100 x 150 ft., brick, steel addition. $150,000. Former bids rejected. Noted May 15.

O., Cleveland—FACTORY—W. S. Tyler Co., E. P. Disbro, vice pres., 3613 Superior Ave., plans by George S. Rider Co., Marshall Bldg., 3 story, basement, 70 x 106 ft., brick, rein.-con., East 36th St. and Superior Ave. $150,000.

Tex., Corpus Christi—REFINERY PLANT—Houston Oil Co., c/o E. H. Buckner, pres., Petroleum Bldg., Houston, and Bruni, large oil refinery, near here. $1,000,000. Private plans.

Ont., Toronto—BOX PLANT—Canadian Wirebound Boxes Ltd., 1000 Gerrard St. E., 1 or 2 story, concrete, brick, steel. $75,000. Engineer and architect not selected.

BIDS ASKED

Ark., Dardanelle—ICE PLANT—See "Contracts Awarded."

N. J., Newark — MINERAL WATER FACTORY—See "Contracts Awarded."

N. J., Newark—FACTORY—See "Contracts Awarded."

N. Y., New York — MILK DISTRIBUTION PLANT—Sheffield Farms Inc., 524 West 57th St., bids about July 10, general contract 125 x 150 ft., Westmoreland Ave. and Home St. $100,000. Private plans. Noted May 15.

Factories and Mills (Continued)

O., Salem—FACTORY—Salem China Co., Salem, F. H. Sebring, bids about July 19, 1 story, brick, 50 x 150 ft., rein.-con., steel, concrete, brick factory, $40,000; tunnel decorating kiln $25,000. Private plans.

Pa., Phila.—MANUFACTURING PLANT—July 8, by Bollinger Co., archts., 12th and Chestnut Sts., 2 or 3 story, basement, 117 x 305 ft., brick, steel, concrete pile found., Water and Snyder Sts., for Becker, Smith & Page, Water and Snyder Sts.

Tex., Denton — ICE PLANT — July 14, by City, c/o B. W. McKenzie, mayor, 25 ton or 50 ton p.d. ice plant. W. N. Harrison, Denton, engr. Noted Jan. 24, 1929, under "Industrial—Buildings."

Va., Amphill (Richmond P. O.)—PLANT—See "Contracts Awarded."

Ont., Brockville — FACTORY — Eugene F. Phillips Electrical Wks. Ltd., soon takes bids altering and constructing factory, $750,000. L. Grant, deGaspe St., Montreal, Que., pres.

Ont., Simcoe—PRINTING OFFICE—July 2, by Pearce Pub. Co., P. G. Pearce, purch. agt., 2 story, 60 x 85 ft., brick printing office.

CONTRACTS AWARDED

Ark., Dardanelle — ICE PLANT — Morgan Utility Co., Rector Bldg., Little Rock, 1 story, 100 x 150 ft., brick, concrete, day labor, $50,000.

Calif., Los Angeles—FEED MILL—Taylor Milling Corp., 1520 San Fernando Rd., 1 story, 165 ft. high, 52 x 55 ft., rein.-con., steel, 1520 San Fernando Rd., to Burrell Eng. Co., 458 Roosevelt Bldg., $50,000.

Ill., Chicago — FACTORY — Wisconsin Steel Wks., 2701 East 106th St., carpentry contract 1 story, 143 x 168 ft., 2800-14 East 110th St., to McClintic Marshall Constr. Co., 8301 Stewart Ave. Est. $185,000.

Ind., Indianapolis—PLANT—Coca-Cola Bottling Co., 265 Mass. Ave., general contract 100 x 155 ft., brick, steel, to W. P. Jungclaus, 825 Mass. Ave. Est. $43,000.

Ind., Terra Haute—PLANT—Terminal Distribution Constr. Co., general contract 115 x 125 ft., rein.-con., brick, steel, to G. W. North Co., 9th and Tippecanoe Sts. Est. $40,000. Quaker Maid Laundry Co., Terre Haute, lessee.

Mo., Kansas City—BARREL FACTORY—Kansas City Barrel Co., 1 story 110 x 200 ft., brick, steel, rein.-con., to J. Gier, 410 East 54th St. Est. $100,000.

Mo., St. Louis—FEED MILL—Ralston Purina Co., 835 South 8th St., 8 story, 34 x 58 ft. and 86 x 125 ft., brick, rein.-con. addition, rear 827 South 8th St., to Jones-Hettelsater Constr. Co., 600 Mutual Bldg., Kansas City. Est. $300,000.

N. J., Newark—MINERAL WATER FACTORY—Amer. Mineral Water Co., 90 Somerset St., 1 story, basement, 50 x 100 ft., brick, steel, plain found., 651 South 11th St., separate contracts. $40,000. M. E. Weiner, 45 Branford Pl., archt.

N. J., Jersey City—CHEMICAL FACTORY—Richards Chemical Wks., 190 Warren St., general contract 1 story, 100 x 100 ft., brick, steel addition, to James Billington, 198 Fairmount Ave. Est. $40,000.

N. J., Newark—FACTORY—J. Padovano, 31 Delancey St., 1 story, basement, 50 x 160 ft., brick, steel addition, plain found., 306-08 Adams St., separate contracts. $150,000. H. Weiler, 40 Komorn St., archt.

N. J., Perth Amboy—PLANT—General Gable Corp., 2 units 1 and 2 story (ultimately 4 story) additions to Standard Underground Cable Plant, to H. K. Ferguson Co., Hanna Bldg., Cleveland, O. $100,000.

N. J., Trenton — POTTERY PLANT — Lockwood, Greene Eng. Co., Inc., engrs. and archts., 100 East 42nd St., New York, general contract 1 story, basement, brick, steel, rein.-con. addition, plain found., to Karno Smith Co., Inc., Broad Street Bank Bldg., for Trenton Potteries Co., North Clinton Ave. Est. $40,000. Noted June 19.

N. Y., Lockport—FACTORY—Simonds Saw & Steel Co., Fitchburg, Mass., steel manufacturing and rolling plant, to Morris & Allan, Inc., Jackson Bldg., Buffalo. Est. $50,000. Noted June 12.

N. Y., New York—BAKERY, etc.—Corporation, c/o I. Robinson, 3489 Jerome Ave., bakery and stores, to Weeks Avenue Constr. Co., Inc., 3489 Jerome Ave. Est. $50,000. Noted June 12.

O., Cleveland—FACTORY—Schmitz-Horning Co., H. M. Schmitz, pres., 777 East 82nd St., 2 story, basement, 38 x 55 ft., brick, to Wm. Dunbar Co., 8501 Cedar Ave. Est. $40,000.

Pa., Erie—FACTORY—Metric Metal Wks., A. Kaiser, plant supt., 10th and Payne Sts., 2 and 3 story, 55 x 100 ft., rein.-con., brick 10th and Payne Sts., to H. Shenk Co., 12th and Sassafrass Sts. Est. $40,000.

Pa., Phila.—PLANT—Sharp & Dohme, 1025 Arch St., chemical manufacturing plant, Broad and Wallace Sts., to United Engineers & Constructors, 112 North Broad St. Est. $40,000.

Va., Amphill (Richmond P. O.)—PLANT—Du Pont Cellophane Co., 2 Park Ave., New York, will build plant for manufacture of cellophane and other textiles made from vicose and nitre cellulose. Dupont Eng. Co., engrs., Dupont Bldg., Wilmington, Del., taking bids on separate contracts. Est. $2,000,000.

GARAGES

PROPOSED WORK

Me., Westbrook—Portland Water Dist., 16 Casco St., Portland, plans by J. C. and J. H. Stevens, 477 Congress St., Portland, 2 story, brick, steel service, shop and office building, $40,000.

N. J., Montclair—Lloyd White, c/o A. E. Ramhurst, archt., 516 Bloomfield Ave., 2 story, basement, 100 x 165 ft., brick, steel garage, showrooms, Glenridge and Grove Sts. $150,000. Noted June 12.

N. Y., Brooklyn—C. Burack sketches by M. Klein, 65 Court St., 140 x 200 ft., service garage, Meeker and Stewart Aves. $85,000.

N. Y., Brooklyn—Dpt. Hospitals, Municipal Bldg., New York, sketches by G. M. McCabe, 96 5th Ave., New York, 2 story, 75 x 110 ft. garage and mortuary, Ocean Parkway and Avenue Z. $150,000.

N. Y., Brooklyn—C. Ketron, 65 Court St., sketches by M. Klein, 65 Court St., 82 x 102 ft., service garage, Roebling St. and Fillmore Pl. $40,000.

N. Y., New York—Twenty-Five Rose Street Corp., S. Witkin, pres., 11 West 42nd St., sketches by W. Shary, 22 East 17th St., 2 story, basement, 105 x 109 ft. service garage, 25 Rose St. $125,000.

N. Y., Syracuse—Lincoln Natl. Bank & Trust Co., South Saline St., plans by M. L. King, Denison Bldg., remodeling Wieting Theatre Block into ramp garage.

R. I., Cranston (mail Providence)—C. Rainone, 987 Cranston St., 1 story, rein.-con. service and repair garage, Cranston St. $40,000. Private plans.

BIDS ASKED

Mass., Brighton (sta. Boston) — Commonwealth Garage, 100 Brighton Ave., taking bids 1 story, brick, steel, service station, repair shop, plain found., Brighton Ave. $40,000. W. F. Bryant & Son, 334 Washington St., archts. Noted June 26.

Mass., Marblehead — Town, Electric Light Dpt., taking bids 2 story, stone, steel, tile service building, Commercial St. $40,000. W. H. Quiner, 75 Pleasant St., archt. Noted June 26.

N. J., Hawthorne—J. C. Van Vlandren, archt., 140 Market St., Paterson, bids about Aug. 1, general or separate contracts 2 story, basement, 90 x 140 ft., brick, steel, plain found., Nelson and Pasadena Aves., for S. Braen, 115 Totowa Ave. Est. $150,000. Noted June 19.

N. J., Plainfield—W. E. Lehman, archt., 972 Broad St., Newark, taking bids general contract 1 and 2 story, basement, 100 x 135 ft., brick, steel garage, office, for Aetna Realty Co., 972 Broad St. $150,000.

N. Y., New York—See "Contracts Awarded."

CONTRACTS AWARDED

Conn., Norwalk — S. Roodner, Washington Ave., 1 story, 70 x 130 ft. and 42 x 50 ft., brick, cast stone service station, stone found., Connecticut Ave. $50,000. Owner builds. Private plans.

Ind., Indianapolis—H. Knue, 654 East 52nd St., brick, steel service station, 52nd and College Sts. $40,000. Owner builds.

Ind., Vincennes—Lincoln Oil Co., brick, steel tile super-service station, 7th and Main Sts., to S. L. Kirk, 311 Harrison St. Est. $40,000.

Mass., Attleboro—General Plate Co., 1 story, concrete, steel service garage, to C. K. Rathbone, Hospital Trust Bldg., Providence, R. I. Est. $40,000.

Mass., Attleboro—G. A. Sweeney, South Main St., 1 story, irregular sized, brick, steel, rein.-con. service garage, show room and repair shop, concrete found., Pleasant St., to H. O. McKinnon & Co., 38 Emery St. Est. $40,000.

Mass., Boston—Firestone Tire & Rubber Co., South Main St., Akron, O., and 141 Brookline Ave., Boston, 1 story, irregular sized, brick, steel, rein.-con. super-service station, plain found., Legion Parkway, High and Warren Sts., to A. S. Gillis Constr. Co., 313 Washington St., Newton. Est. $40,000.

Mass., Brookline—Hotel Beaconsfield Trust, 1731 Beacon St., Boston, 1 story, concrete, steel service garage, to James Driscoll & Son, 94 Washington St., Boston. $50,000.

Mass., Wrentham—Commonwealth of Massachusetts, Dpt. Mental Diseases, 2 story, brick service building, plain found., at State School, to R. H. Sewell & Co., Central St., Franklin. Est. $40,000.

N. Y., New York—Halpern Constr. Corp., 450 East Fordham Rd., 2 story, 100 x 100 ft. service, garage, separate contracts. To exceed $70,000. G. W. Swiller, 4215 3rd Ave., archt. Noted May 29.

SHOPS AND FOUNDRIES

PROPOSED WORK

N. Y., Brooklyn — SHOP and STORAGE — White Co., 407 Rockland Ave., Cleveland, O., sketches by A. F. Edwards, 230 Park Ave., New York, 110 x 189 ft., shop and storage, 3rd Ave., Union and Sackett Sts. $100,000.

BIDS ASKED

Mass., Everett — CARPENTER SHOP — Merrimac Chemical Co., Chemical Lane, taking bids 1 story, brick, steel, concrete found., Chemical Lane. $40,000.

N. J., Fort Lee—MACHINE SHOP, etc.—G. Dexter, archt., 201 Main St., bids about Aug. 1, general contract 25 x 240 ft. machine shop and 20 x 200 ft. shipping building, both 1 story, basement, Lemoine Ave., for Consolidated Film Industries, Inc., Lemoine Ave. $75,000. Noted June 19.

N. Y., New York—REPAIR SHOP—Consolidated Gas Co. of New York, 4 Irving Pl., bids about Aug. 1, general contract repair shop, 71st and Exterior Sts. $350,000. J. F. Hunter, 4 Irving Pl., archt. Noted May 22.

CONTRACTS AWARDED

Minn., Coleraine—SHOP, etc.—Canisteo Cliffs Iron Mining Co., general contract 1 story, 63 x 197 ft., brick machine shop, 1 story, 36 x 106 ft., brick locomotive house; 1 story, 25 x 30 ft., brick storage house, 1 story, 40 x 124 ft., steel, brick warehouse and garage, 40 x 50 ft., brick office, two 18 x 26 ft. double garages, 4 resident buildings, to Pfeffer Constr. Co., 402 Builders Exch. Bldg.

O., Cleveland—SHOP—Cleveland Interurban R.R. Co., Terminal Tower, 1 story, 57 x 142 ft., brick, steel, electric car repair shop, 6801 Sidaway Ave., to Sam W. Emerson Co., 1836 Euclid Ave. Est. $60,000.

POWER PLANTS

PROPOSED WORK

Minn., Ely—Pickands-Mather Co., 700 Sellwood Bldg., Duluth, bids in July, engine house, $50,000. Private plans.

N. Y., New York—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., plans by J. H. Doorly, 466 Lexington Ave., 1 story, boiler house, 127 Marble Hill Ave. $40,000.

BIDS ASKED

Man., Churchill—July 10, by J. W. Pugsley, secy. Dpt. Railways & Canals, Ottawa, Ont., generator room and boiler-house equipment for power plant.

CONTRACTS AWARDED

Ind., Marion — Indian General Service Co., general contract 60 x 160 ft., rein.-con., brick, steel sub-station, storage plant, to G. W. Heinzmann, 1740 West 1st St. Est. $60,000.

Mich., Plainwell—Michigan Co., 1 story, 50 x 180 ft., brick, steel, rein.-con., hollow tile power plant, to D. F. Miller Co., Kalamazoo. Est. $300,000.

Mich., Traverse City—Michigan Pub. Serv. Co., concrete power house to develop 2,200 kw., 475 ft. earth dam, 45 ft. high, with concrete core wall, supported on steel sheet piling found., across Boardman River, to Price Bros. Co., Lansing. Est. $500,000.

N. Y., New York—Bd. Higher Educ., Main Bldg., 139th St. and Convent Ave., installing 3 motor generating sets in generating room, Compton Hall, College of City of New York, to Westinghouse Electric Co., 150 Bway., $7,450. Noted June 5.

Wash., Seattle—Bd. P. Wks., thirteen 2,000 kw. transformers for local substations, to Amer. Brown, Boveri Co., 220 9th St. N., $61,945; network protectors, to Westinghouse Electric & Mfg. Co., Lloyd Bldg., $21,443; insulating and line material, to Fobes Supply Co., 558 1st St. S., $8,263. Grand total $91,651. Noted May 8.

WAREHOUSES

PROPOSED WORK

Mass., Watertown—Western Electric Co., 195 Bway., New York, and New England Telephone & Telegraph Co., 159 Mass. Ave., Boston, warehouse, supply depot, Mt. Auburn and Grove Sts. To exceed $150,000.

BIDS ASKED

Pa., Phila.—See "Contracts Awarded."

CONTRACTS AWARDED

N. J., Jersey City — Fred Snare Co. (contractors), 114 Liberty St., New York, awarded steel for pier and warehouse, Hudson Ave., to Truscon Steel Co., Youngstown, O., for Erie R.R. Co., 50 Church St., New York. Noted June 26 under "Contracts Awarded."

N. Y., Syracuse—A. Cooper, Syracuse, 1 story, basement, 100 x 100 ft., manufacturing warehouse, separate contracts and day labor, $150,000. Great Atlantic & Pacific Tea Co., 420 Lexington Ave., New York, lessee. Noted June 19 under "New York, Buildings—Unclassified."

Pa., Phila.—Suburban Realty & Constr. Co., Wayne Ave. and Sedgwick St., 1 story, 100 x 300 ft., separate contracts. Est. exceeds $200,000. Great Atlantic & Pacific Stores, 420 Lexington Ave., New York, lessee.

See proposal advertising on page 138

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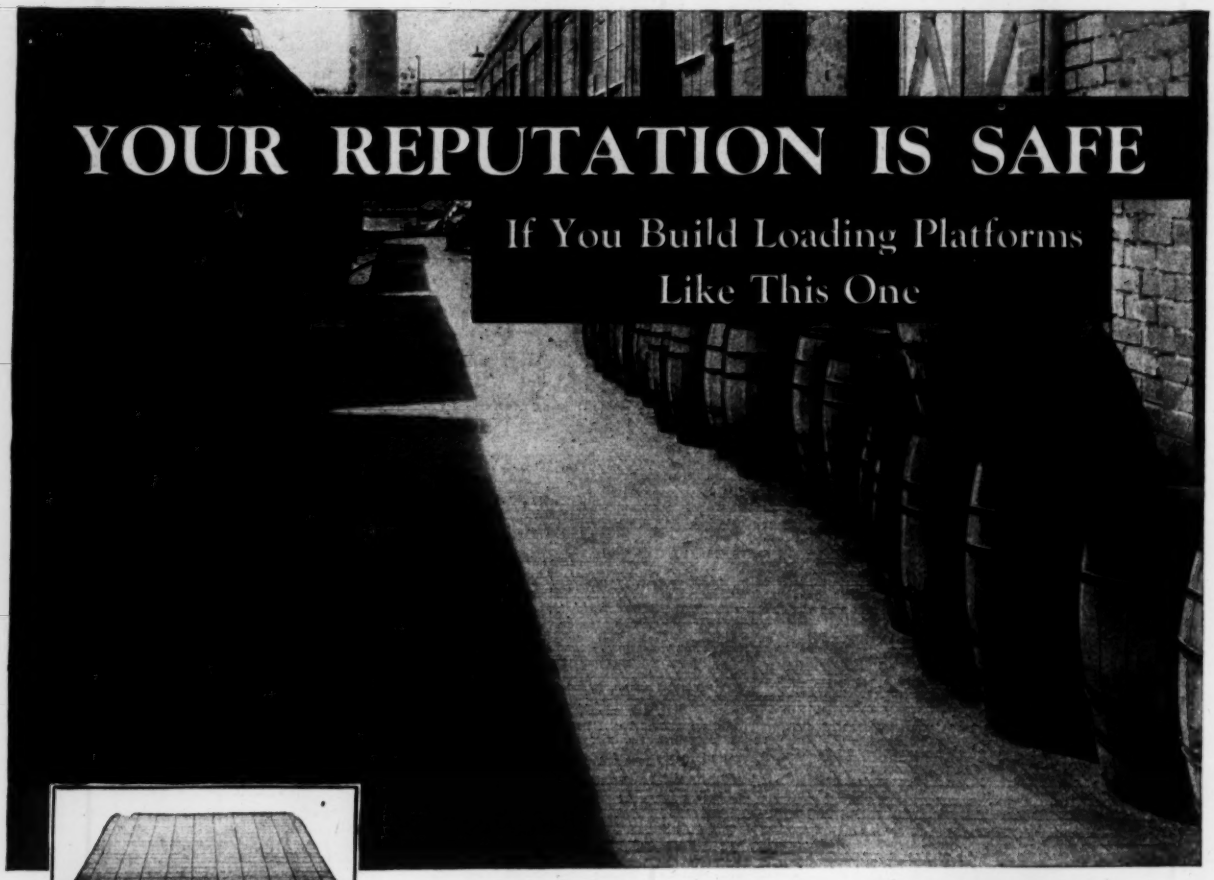
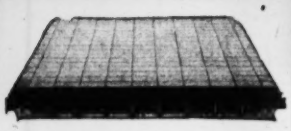


YOUR REPUTATION IS SAFE

If You Build Loading Platforms Like This One



Simplest and most economical to install, Mitco Armorgrids are merely laid on the rough base, leveled up, and the finishing fill poured into the mesh of Mitco Armorgrids. No tie rods, no bolting, no assembly nor fitting of any kind.

Mitco Interlocked Steel Grating and Mitco Shur-Site Treads are the ideal selection where open steel flooring and stair treads are required. They are high in strength and rigidity, have non-clogging and non-slipping surfaces, and provide maximum light and ventilation. Write for bulletin.

YOUR customer is satisfied . . . . there are no complaints . . . the structure gives long service with the very minimum of maintenance . . . . when you recommend and use Mitco Armorgrids for the reinforcement of loading platforms, floors, ramps and driveways poured of concrete, cement or other plastics.

Mitco Armorgrids, imbedded in the structure, provide a rail-like steel mesh that absorbs the brunt of traffic. Cracks, potholes and depressions cannot develop. The surface is always uniform and level, needing no repair, facilitating trucking and walking, and improving safety.

For floor armoring work, Mitco Armorgrids are preferred by contractors because they are simplest and most economical to install. No tie rods, no bolts, no fitting nor assembly of any kind. Merely lay the panels on the rough base and pour the finishing fill into the mesh of Mitco Armorgrids.

Your customer will be well satisfied . . . . and your reputation is safe with shock-proof, long-lasting structures armored with Mitco Armorgrids.

If you haven't a copy of the Mitco Armorgrid bulletin, may we send you on? Write us today.

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Makers of Mitco Shur-Site Treads, Hendrick Perforated Metal Screens and Elevator Buckets

MITCO ARMORGRIDS

for longer life from floors, platforms, ramps and driveways